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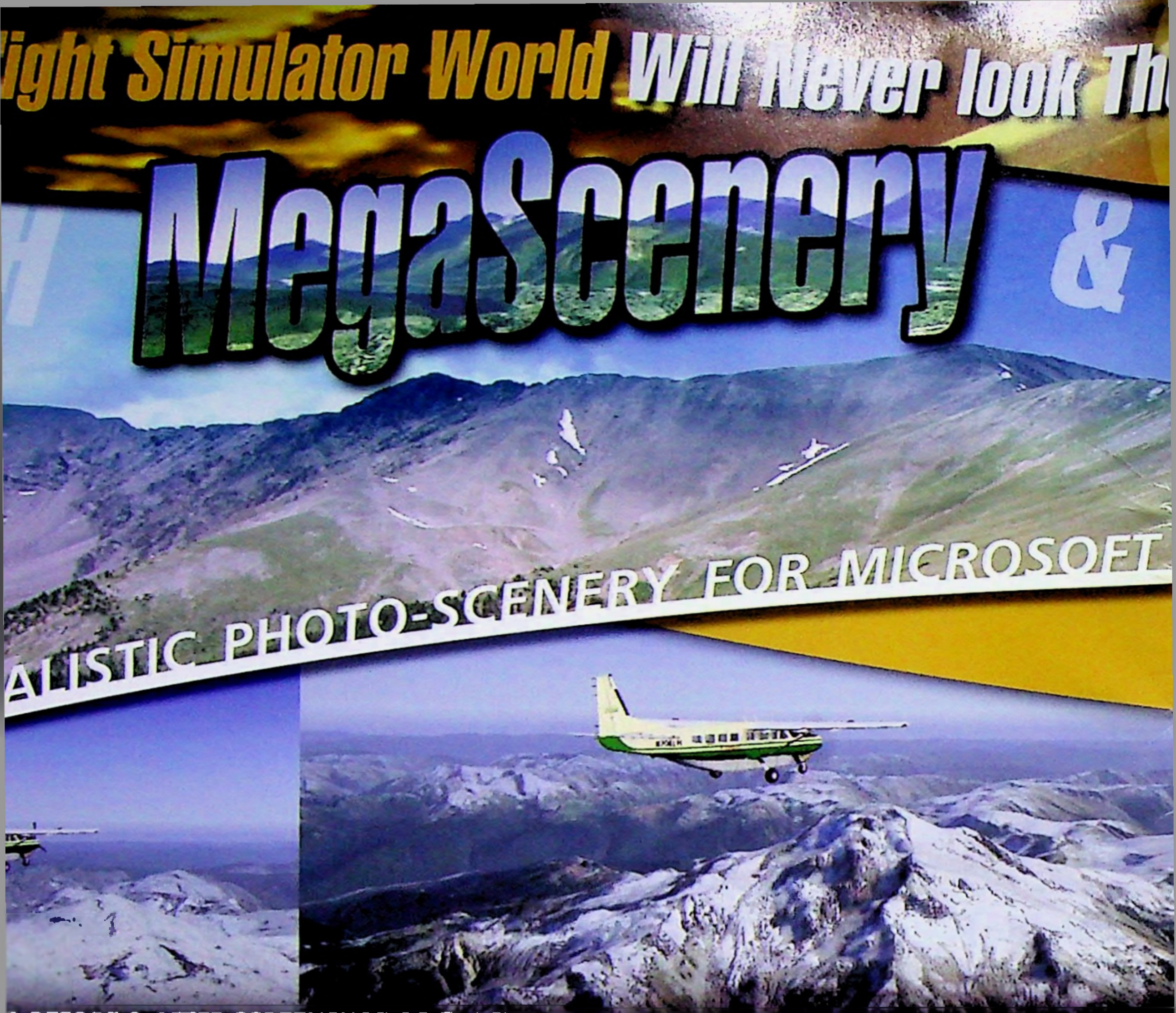
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- Day and Night Scenery. Soar and explore the real world - during the day and at night!
- Winter Scenery too! In selected areas, where required by geographical location, you also get realistically rendered snow covered scenery. e.g. MegaScenery New York. So you're getting up to 3 sceneries in the one package.
- Improved Autogen. We replace default FS2004 autogen scenery with our "more-correct" version.
- Hi-resolution DEM (mesh). While MegaScenery is so realistic that you don't need hi-res mesh - our recent releases incorporate hi-res mesh at 30 meters.
- The list goes on... You also get realistic water. Our hand etched coastlines and shores mean that bodies of water such as lakes maintain their "water properties". So you can land your float planes on them
- Relocation of default FS2004 objects to correct location. That's right MegaScenery, upon installation, will relocate default FS2004 objects to their absolute correct geographic co-ordinates.
- Faster Framerates! Yes, your Flight Simulator, with hyper-realistic MegaScenery, will run smoother and faster than the default artificial scenery.
- Developed specifically for Microsoft Flight Simulator 2004
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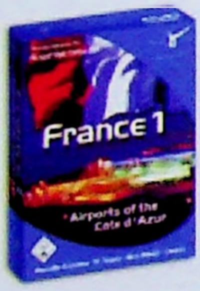
CODE: SBOOST-CD **PRICE:** US$24.95 AUD$34.95
***SUB. PRICE:** US$23.70 AUD$33.20

France 1 – Airports of the Cote d' Azur



France 1 contains 4 of the most well known airports along the famous Cote D´Azur! Built in G-max and using brilliant textures, this add-on for Microsoft Flight Simulator 2004 is one of a kind and lets the computer pilot jet-set to the glamorous south coast of France. Contains the following airports; Marseille Provence, Cannes, Nice, St. Tropez. France1 is fully AI Traffic compatible and comes with a printed manual and printed XL flying charts!

CODE: FR1 **PRICE:** US$34.95 AUD$59.95
***SUB. PRICE:** US$33.20 AUD$56.95

Airbus Holiday Destinations

Get a set of Airbus aircraft, and a set of holiday destination airports to fly them to! This add-on for the Microsoft Flight Simulator 2004 contains part of the Airbus fleet with 3 well-equipped Airbus models as well as 3 superbly detailed European holiday destinations. The aircraft models, an Airbus A330-200, A321 and A320 all have highly detailed cockpits (2D and 3D). Real sounds, original instruments and a realistic flight model are only some of the highlights of these fabulous virtual aircraft. Scenery includes Kos (Greece), Faro (Portugal), Monastir (Tunisia).

CODE: AIRBHOL **PRICE:** US$39.95 AUD$69.95
***SUB. PRICE:** US$37.95 AUD$66.45

Pilatus PC-12

The Pilatus PC-12 - The Real Swiss Army Knife of aviation, now available on CD for FS2004! This PC-12 aircraft package offers several different configurations that include: commuter, executive, cargo, and multimission surveillance. This versatility along with the PC-12's advanced aerodynamic airframe will allow you to explore the FS world with unmatched flexibility. The aircraft add-on features include: a visual model with and without a virtual cockpit/cabin, accurate flight modeling, advanced glass avionics suite and a custom GPS system.

CODE: PC12 **PRICE:** US$29.95 AUD$49.95
***SUB. PRICE:** US$28.45 AUD$47.45

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CODE: PCABNZ **PRICE:** US$22.95 AUD$39.95
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CODE: EURROADS **PRICE:** US$39.95 AUD$69.95
***SUB. PRICE:** US$37.95 AUD$66.45

ATR72-500

Computer pilots can experience first hand what it is like to fly the real ATR 72-500 in FS2004. Select to fly from the Captain's or First Officer's panel in either of the standard brown or newly available blue/grey cockpit configuration with highly details and functional panels. Explore the 3D exterior model and listen to the real cockpit and engine sounds recorded from the real ATR in a run-up in Toulouse. Highly recommended!

CODE: ATR72 **PRICE:** US$34.95 AUD$59.95
***SUB. PRICE:** US$33.20 AUD$56.95

Airliner Pilot

Have you ever wanted to fly for a major airline? Fancy traveling the world, being responsible for millions of pounds worth of material and for the safety and comfort of hundreds of passengers? Wouldn't it be great if you could do it in FS2004?
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CODE: AIRPILOT **PRICE:** US$44.95 AUD$69.95
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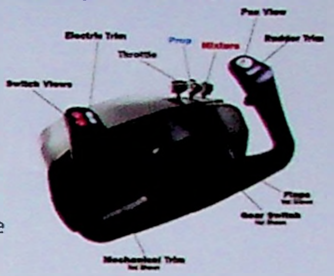

The CH Flight Sim Yoke USB gives you a flight yoke that's as close as you can get to the real thing without spending the many hundreds of dollars that you would on high end yokes. Now you can control your aircraft like a real pilot would with left hand on the yoke and right hand controlling your throttle, prop and mixture and managing the rest of your cockpit.

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CODE: CHFSYKUSB **PRICE:** US$129.95 AUD$269.95
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CODE: CHPROPUSB **PRICE:** US$129.95 AUD$249.95
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The fourth title in the Megascenery series of ultra-realistic satellite image-based scenery for FS2004 is coming soon with these hot features on DVD:

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  - Mt St Helens - Mt Adams
  - Cascade, Olympic and Wenatchee Mountains
  - Puget Sound & San Juan Island
  - Columbia River
  - And Everything Else in the area covered!
- 50 Instrument Equipped Airports & Numerous Non Instrument
- Major Airports.
- Includes Day, Night and Winter Scenery textures.

CODE: MS-PNW-DVF **PRICE:** US$39.95 AUD$59.95
***SUB. PRICE:** US$37.95 AUD$56.95

Megascenery USA 2004: Southern California

Los Angeles, San Diego, Palm Springs, Catalina Island, Big Bear City, Mt San Jacinto, Malibu... See It All! Experience It All! From the vantage point of your aircraft with MegaScenery Southern California. This part of the world is visually stunning. You don't even realize that 10,000+ feet peaks exist in Southern California. In fact they're even higher! This title fully captures the essence of the Los Angeles Basin. 14,000 square miles. Includes night scenery too!

CODE: MS-LAX-CDL **PRICE:** US$29.95 AUD$64.95
***SUB. PRICE:** US$28.45 AUD$61.70

MegaCITY USA 2005 Dallas/Fort Worth

MegaCITY USA 2005 - Dallas/Fort Worth puts you in the skies above the Dallas/Fort Worth metroplex at a level of realism that you've never seen it before in Microsoft Flight Simulator. It's created by taking 1 foot per pixel aerial photographs and placing them into Microsoft Flight Simulator 2004. You're not seeing a synthetic world. No, you're flying over an actual image of the Dallas/Fort Worth area and well.... it's so real, you may as well consider that you're actually there.

CODE: MCTY-DFY **PRICE:** US$24.95 AUD$39.95
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CODE: FS2004 **PRICE:** US$34.95 AUD$89.95
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X-Plane

X-Plane boasts the fact that they have the best flight modeling engine in a home PC-based simulator, and rightly so. Favored by many hardcore sim users, X-Plane's detail in its flight models are second to none. While not as visually appealing as the Microsoft simulator overall, X-Plane makes up for it in its smooth handling and many customizable tech features. X-Plane comes with subsonic and supersonic flight dynamics, sporting aircraft from the Bell 206 Jet-Ranger helicopter and Cessna 172 light plane to the supersonic Concorde and Mach-3 XB-70 Valkyrie. X-Plane ships with about 40 aircraft spanning the aviation industry (and history), and several hundred more are freely downloadable from the internet. If you enjoy the technical side of aircraft flying, and analyzing flight dynamics, you can't go wrong with X-Plane. The program is compatible with both PC and Mac systems too!

CODE: XPLANE **PRICE:** US$49.95 AUD$79.95
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CODE: WEXTRLND **PRICE:** US$29.95 AUD$54.95
***SUB. PRICE:** US$28.45 AUD$52.20

O&O Defrag Version 8

Recommended By PC Aviator As The Best Defragger For Flight Simulator Users! Fragmentation can be a major cause of slow loading times and blurry scenery where high resolution textures do not kick in fast enough. Features five defragmentation methods - Name, Modifed, Accessed, Space & Stealth. Automatic One Button Defrag. Complete and Flexible Scheduling including Screensaver Mode. Activity Guard reduces system resource usage if you're working while a Defrag is being performed. Fully packs, reorganizes and consolidates your hard drive to minimize re-fragmentation. For Windows XP.

CODE: OODFRG8 **PRICE:** US$44.95 AUD$69.95
***SUB. PRICE:** US$42.70 AUD$66.45

PMDG 737NG 800/900

With this new package PMDG offers the long awaited larger versions of the 737 series. This package contains the 737-800 and -900 in many various liveries. Many enhancements have been made to the flight decks for added functionality and smoother frame rates. The inclusion of such features as TCAS 2, pushback capability, new CDU and audio panel functionality make the 800/900 package really shine.

CODE: 737NG800 **PRICE:** US$39.95 AUD$69.95
***SUB. PRICE:** US$37.95 AUD$66.45

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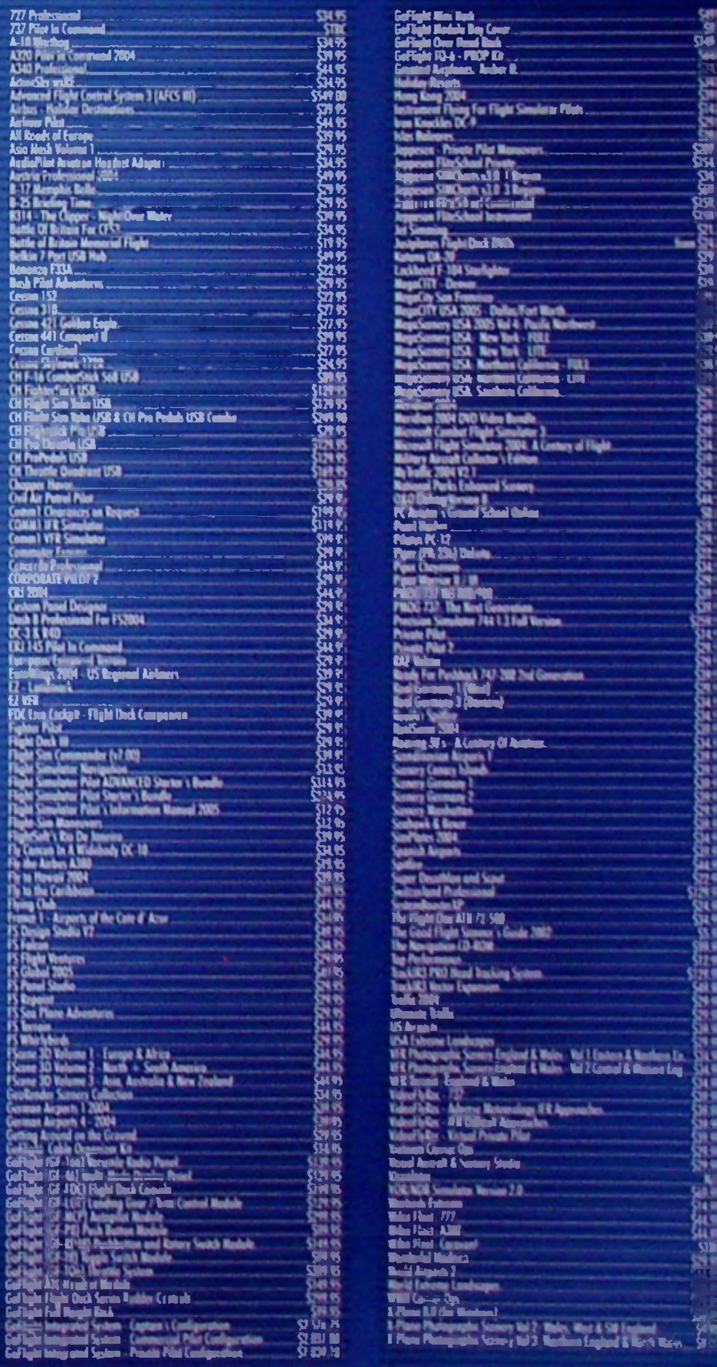

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From the EDITOR

So, here we are at the September issue, and the 72nd issue of Computer Pilot Magazine to be published since inception. The upcoming December 2005 issue will be our 75th, and if this was a marriage, I believe we'd be celebrating a diamond anniversary, traditionally at least. Nevertheless, as we take one step closer to the 75th issue, and another to our 100th issue, I'd like to thank the continuous efforts of the Computer Pilot team of staff and contributing writers for making this and every issue possible. A ton of work goes into producing each issue, and unfortunately for us, it is not an overnight effort. Each issue takes up to ten weeks from start to finish, and we work on several issues at once in various stages of production. As you can imagine, things could easily get mixed up in the chaos, but somehow it manages to all come together at the right time and date and the end product always seems to be greater than the sum of its parts! Thanks also goes out to you, the reader and subscriber, for keeping us on our toes and ensuring the continued legacy of Computer Pilot Magazine. We trust you enjoy each and every issue.

I'd like to draw your interest and attention to our article on the Virtual Thunderbirds this month. Even if you are not a combat flight simmer, I am sure you will find this piece very interesting indeed. Mike Glynn explores the growing world of simulated aerobatic teams and the dedication and skill their members possess to produce a thrilling virtual air show that will soon be coming to a screen near you. Don't miss it. A great read and well put together by Mike. Roger Curtiss is beginning a very detailed series on the ins and outs of Air Traffic Control this month, highlighting the function and tasks associated with each controller position. If you fly online regularly using one of the virtual air traffic networks, this series will give you the ground knowledge to be able to interact, understand, and communicate with ATC effectively. Derek Davis has been kicking tires and lighting fires with the all new Falcon 4: Allied Force release and brings you the full review this issue. And of course we have more panel building articles, more VFR flying and a ton of quality flight lessons to get your yoke and pedals into this time around.

There is plenty to keep you amused, entertained and informed in the September issue, so get into it, enjoy it, and keep the blue side up.

"Roger Victor, you have Vector, over!"
"You have clearance Clarence" – quotes from the movie Flying High.

Dean Bielanowski
Editor

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A-4 Series Expands

RAZBAM have just released the final volume of the "The Skyhawks" series for both Microsoft Flight Simulator and Combat Flight Simulator. The first of Douglas's A-4 prototypes flew in 1954 and not only met the needs of the US Navy and Marine Corp but set a new speed record at the same time. The success of the A-4 led to production lasting for an amazing 26 years. A staggering 2,960 of these aircraft were built, the last of which flew in 1980. The A-4 continues to be used by a number of countries still to this day.

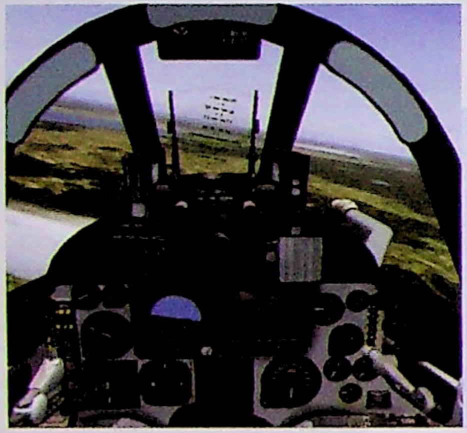
The maneuverability and speed of the aircraft made for the perfect adversary training aircraft as used in the real Top Gun Fighter School. Some of you no doubt will remember seeing these in the movie 'Top Gun' starring Tom Cruise.

This last volume completes the entire collection of A-4 variants. The new version has an updated flight model allowing for the more realistic simulation of weights and drag. "The goal of the flight model was not to make it harder to fly, but to give you a better feel for flying the real thing. Once you get use to flying this model, you will find that you will be able to get more out of it." RAZBAM said.

Features:

- Working Canopy.
- Working Tail Hook.
- Dynamic Shine (FS9 & CFS2).
- VC Animations.
- Cat-Launch Simulation
- Aircraft Carrier ARA 25 DE MAYO (CFS-2)
- Custom Gauges
- Improved Flight Characteristics (extensively tested and approved by real A-4 pilots).

All volumes of the A-4 are available for purchase via the links on the RAZBAM website at **http://www.razbam.tk/** Volume 4 is retailing for €15.99 and is available online only (download/purchase).



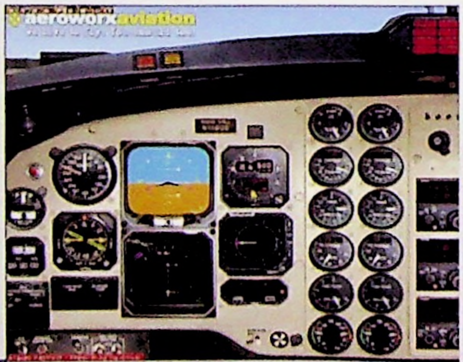
Flight 1 Releases X-treme King Air B200

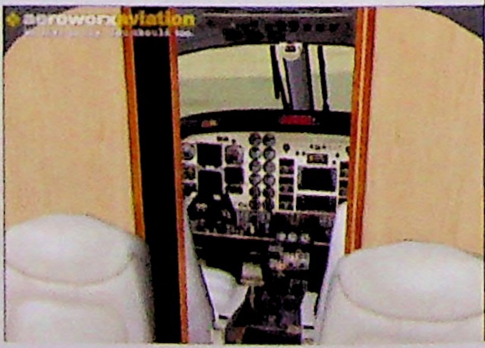
MANY SIMMERS are familiar with the high quality King Air 200 model developed and released by Aeroworx Aviation. Flight 1 has jumped onboard this franchise and has released the new "X-treme" King Air edition just recently. Some of the new features of the Aeroworx X-treme King Air B200 include:

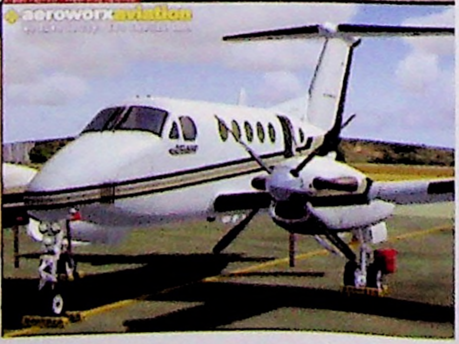
- All new Sperry Analogue Cockpit.
- BFG Skywatch TCAS.
- New photoreal, custom gauges.
- Realistic systems modeling tested by B200 pilots.
- Enhanced sound effects, flap and gear call-out's etc.
- New models built using 3D Studio Max and Gmax.
- Virtual cockpits and cabins with animated, interactive controls.
- Comprehensive Pilot's Operating Handbook (POH).

The good news is that if you are an exisiting owner of the Aeroworx B-200, you can obtain the upgrade to the X-treme edition absolutely free (contact Aeroworx to obtain it). If you are not, you can purchase the X-treme edition direct from the Flight 1 website at **www.flight1.com**

The upgrade is currently only available by download, however, a CD-ROM version of the B200 X-treme edition is expected to become available at a later date for new customers. Flight 1 and Aeroworx have been collaborating on various projects over the last year, and both parties expect that the new, expanded version of the King Air will be popular.







GoFlight Release New Software

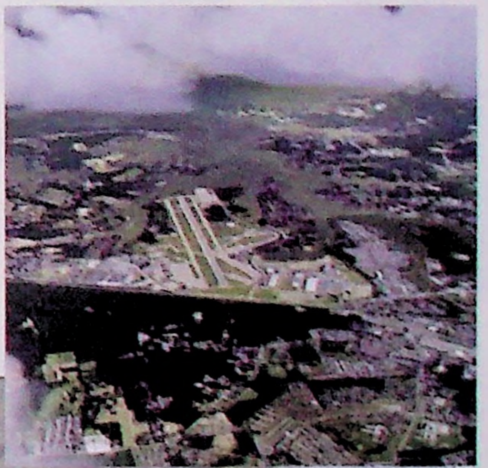
THE FOLKS over at GoFlight Inc., makers of hardware modules for flight sim panels have been very busy recently, releasing a new software update for their products and overhauling their website with a new design and look. The update includes many user-requested features and enhancements as follows;

- Cockpit function assignments are now stored in text files, and can easily be copied, edited, and shared among GoFlight owners. Configurations can be loaded and saved on demand to make it possible to set up unique configurations for different aircraft.
- Fans of the Level-D 767 can now use their GF-MCP Advanced Autopilot module to control the AFDS in the aircraft. Every knob, switch, display and LED on the GF-MCP can be custom assigned, allowing a completely flexible panel layout that can match the autopilots of many different aircraft.
- Configuration of the GF-RC Rudder Controls has been made simple with the addition of a new Windows Game Controllers property sheet. This new panel is displayed during testing or calibration of the rudder controls, and features an easy-to-read graphic display, showing the position of the proportional toe brakes and the rudder input.
- Many new functions and enhancements are described in the README.TXT file that is included in the release.

The update is available free of charge and ready for download from the "Support" section of the company's website at **www.goflightinc.com**
Be sure to grab it if you own any GoFlight modules.

Next MegaScenery Title Announced!

PC AVIATOR recently announced the fifth title in its MegaScenery series of photo-scenery for Microsoft Flight Simulator 2004 – *MegaScenery Volume 5: Washington DC/ Baltimore/Mid Atlantic*
"Flight Sim pilots can now soar the Flight Simulator skies and take in all the sights and scenery over 20,000 square miles of the Mid Atlantic region of the United States in photo-real detail including: the nation's capital Washington DC, Baltimore, Northern Virginia, including Richmond, and Chesapeake Bay."
Known for its busyness both on the ground and in the air this region of the USA gives flight simmers plenty to see and enjoy from the air including flying into 3 of the major international airports this area is renowned for – Washington Dulles International (IAD), Washington National (DCA) and Baltimore Washington international (BWI). These 3 airports combined handle 4,000 movements a day and are all within a 40 mile radius of each other. This busy area of 5,000 square miles, including the cities of Washington DC and Baltimore, is recreated in *MegaCITY* source resolution of 2 feet per pixel using aerial photos supplied by the world's leading aerial photographic provider, AirPhotoUSA. The remaining 15,000 square miles of rural regions are sourced from 5 meter per pixel satellite imagery.
"This is the first time that this Mid Atlantic region has been covered at this size and in so much detail as scenery for Microsoft Flight Simulator. It will give flight sim pilots hundreds upon hundreds of hours to soar and explore the very busy Mid Atlantic skies on their PCs with Microsoft Flight Simulator."
MegaScenery USA 2005 - Volume 5 – Washington DC/Baltimore/Mid Atlantic will be available in early Qtr 4 2005.
It will be available on DVD in Full Kit version (US$39.95) and Lite version (US$29.95). Full Kit version provides users with full-color aeronautical maps and charts of the area. Head on over to **www.megascenery.com** for full product information and preview screenshots.



Cirrus SR20 G2 Enters Beta Testing

EAGLESOFT Development Group, well-known for their quality business and corporate jet add-ons for Microsoft Flight Simulator have temporarily left the jet arena to produce their new Cirrus SR20 G2 model for FS2004. They recently announced the product has entered beta testing, and judging by the feature list, it appears this package will be just as good as all their previous offerings. Features of the SR20 package include:

- Gmax Model: Full featured model including clickable Virtual Cockpit.
- Reflective Textures and Dynamic Shine.
- Multiple animated surfaces including: Pilot, All Control Surfaces, Passenger Doors, Luggage Door, Oil Check Door, Sun Visors, VC Rain Effects, Tinted Windows, and Landing Light.
- 32 Bit and DXT3 Reflective, Night Time Chrome Textures.
- Three Factory Liveries included.
- Zoom-in panel with Avidyne Flightmax Entegra Primary Flight display and Multi Function display.
- Dual Garmin GNS 430 Radio Stack, Garmin GMA 340 Audio Panel, Garmin GTX 330 Transponder.
- Stec 55X Autopilot.
- Operating CAPS Parachute System.
- Clickable Virtual Cockpit [FS2004 and up].
- Official Eaglesoft Liveries by Bill Browning and Ed Knapp, will be available at major flight simulation libraries following release.

The unique parachute system employed in the real Cirrus aircraft has already been proven effective in the real world, with more than a few pilot's lives saved as a result of gentle descents allowed by the parachute deployment system following engine failure and other airborne issues. It is good to see this particular aircraft is finally being created in detail for Flight Simulator. More information can be found at **www.eaglesoftdg.com**
No price or release date has been set for the product as yet.

nVidia 7800GTX Top Dog?

nVidia has moved a step in front of fierce rival ATI with the worldwide release of yet another high-end graphics card. With the battle for gamer's money becoming intense, ATI seemingly cannot keep up. They have announced that the release of their next graphics card is still some months away. This no doubt brings broad smiles to the bosses at nVidia as the power hungry gamers upgrade their cards to the latest and greatest available.

This is also the first high-end graphics card only available for PCI-Express, signaling the nearing end of the dated AGP format.

With the latest release NVIDIA has already received some great press:

nVIDIA
GEFORCE
7 SERIES

"The world's leading game developers are singing the praises of the new GeForce 7800 GTX graphics processing unit (GPU)."

What benefits these new cards have in Flight Simulator or other sim software is yet to be tested, but it's proven on newly released games such as Electronic Art's *Battlefield 2*.

"Battlefield 2 is set in large outdoor environments that make heavy use of transparent and semi-transparent textures. nVidia transparency AA improves the detail and quality of those textures with stunning results," said Torbjörn Söderman, rendering programmer of DICE. "The transparency AA feature of GeForce 7800 GTX enables anti-aliasing of effects that were not possible before."
There is no doubt that future releases of Flight Simulator will be developed to make use of the newest technology available. It's exciting to think what the future may hold.
For more information and technical specs on the GeForce 7800, check the product specs page at **http://www.nvidia.com/page/specs_gf7800.html**

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Saturday, September 17th - Registration, Exhibitions & Concurrent Papers Sessions.
Saturday, September 17th Evening - Guest Speaker Capt. Suzanna Darcy-Henneman - Awards Banquet
Sunday, September 18th - Exhibitions

For more information and registration: http://www.avsim.com

Free Flying in Hawaii - Part II

BY DR. DAVID WILSON-OKAMURA

Part one of this article was a kind of pre-flight. Now, in part two, we'll talk about what happens after takeoff. The point here is not to catalogue every crest and crevice. Instead, I want to offer some general guidelines for not getting lost. This is possible in Hawaii, because none of the islands are very large, and because most of them have a distinctive shape that you can use to navigate—without resorting to GPS, VOR, or NDB. If the weather is good, you can even fly without a compass, although I don't recommend that for flights over open water. But Hawaii is an ideal environment for getting your head out of the cockpit and steering by what's outside.

Overview of the Island Chain

For pilots and passengers flying in from abroad, there are three main ports of entry: Honolulu International, on Oahu; Kahului International, on Maui; and Kona International, on the Big Island.

Now that we're here, let's have a look around. Technically, the Hawaiian Islands are an archipelago that begins with Kure Island in the north (part of the Midway chain) and stretches south to the Big Island of Hawaii itself - a distance of roughly 1,400 nm. Normally, though, when we talk about Hawaii, we mean the southern cluster of eight islands that were united under King Kamehameha the Great in 1810 and annexed by the United States in 1898. From left to right, these are: Niihau (pronounced "nee-ee-how"), Kauai ("cow-ah-ee" or just "cow-eye"), Oahu ("oh-ah-hoo"), Molokai ("mole-oh-kah-ee" or "mole-oak-eye"), Lanai ("lah-nah-ee" or "lah-nigh"), Maui (rhymes with "wowie"), Kahoolawe (kah-hoe-lau-eh) and Hawaii. From Niihau to Hawaii is about 520 nm, which is roughly the same length as Great Britain. In other words, it is far enough to be interesting, but not so far as to be out of range for a Cessna 172. Most of the islands are also close enough to see one another when the weather is clear. The only exception is Kauai: from Lihue to Dillingham (on the westernmost tip of Oahu) it is almost 80 nm over open water, and into the drink if the engine dies before you get there.

Oahu

Now let's look at the islands individually. We'll start with Oahu, which is the home of Honolulu and Pearl Harbor, and is where most people arrive in Hawaii. In fact, the name Oahu means "gathering place."

There is one landmark that everybody learns when on arrival in Honolulu: Diamond Head crater, so-called not because it is shaped like a diamond (this puzzled me for a long time), but because early in the nineteenth century British sailors found calcite crystals in the crater and mistook them for diamonds. The wonderful thing about Diamond Head is that it's so hard to miss. If you can see Diamond Head then you know that you are not far from Honolulu. Look for the big hotels - that's Waikiki Beach - and follow them west hugging the coast until you see Honolulu airport.

That's two landmarks: Waikiki and Diamond Head. There are only three more that you need to know. The first is another big volcanic crater, Koko Head. If you are facing north then Koko Head is to the right of Diamond Head, and marks Oahu's eastern tip. If you are flying to Oahu from one of the neighboring islands to the east - Lanai, Maui, Molokai, or Hawaii - then Koko Head is the first thing you will see when you get to Oahu. Keep flying west along the southern shore until you see Diamond Head. Just beyond that you will see the hotels of Waikiki, then Honolulu airport, and after that, the entrance to Pearl Harbor.

The other landmarks that will be useful on Oahu are two mountain ranges. The biggest islands in Hawaii all have a similar profile: when viewed from the side, Maui, Oahu, and Hawaii all look something like a camel's back, with one hump on each side and a valley in the middle.

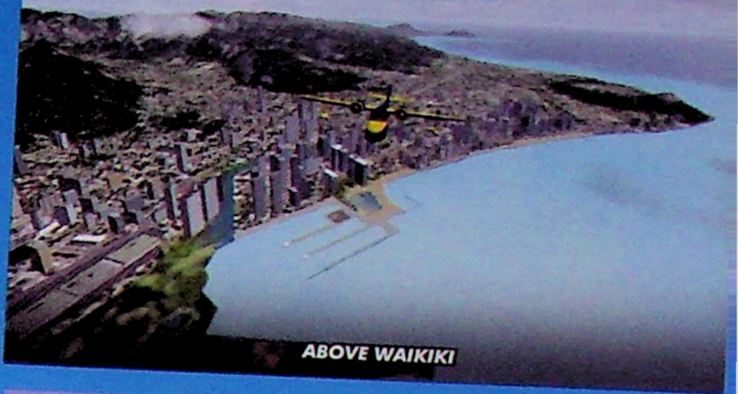
On Oahu, the two humps are called Waianae (why-uh-nigh) and Koolau (co-oh-lau, rhymes with solo cow). Why should you learn the names? First, to impress your friends at the next barbecue. Second, if you fly online, knowing what the major landmarks are called will help you communicate with controllers. Third, knowing the name of a thing makes you more aware of it.

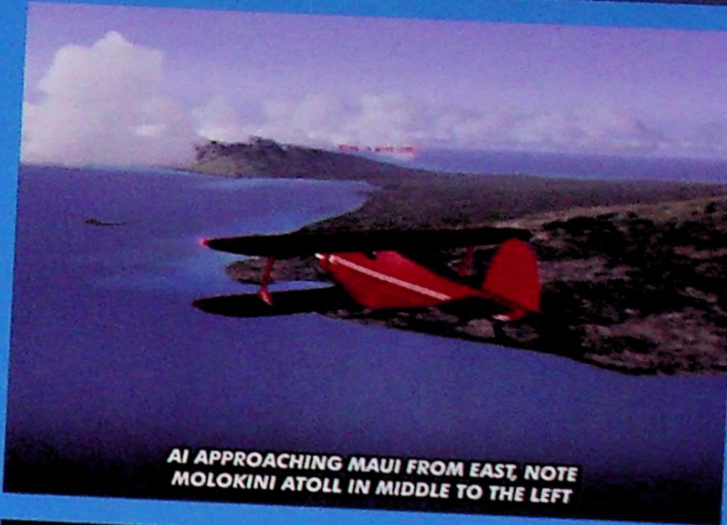
Now, about those two mountain ranges: Waianae is on the western side of the island, Koolau is on the east, and Pearl Harbor is in the middle. This is useful to know, because if you are coming to Oahu from the north or south you can always find Pearl Harbor and Honolulu: just steer for the space between the two mountain ranges. If you are coming from the south you will see Pearl Harbor right away. If you are coming from the north you will have to pass through a broad valley first. Either way, the basic procedure is the same: find the two mountain ranges and aim for the middle.

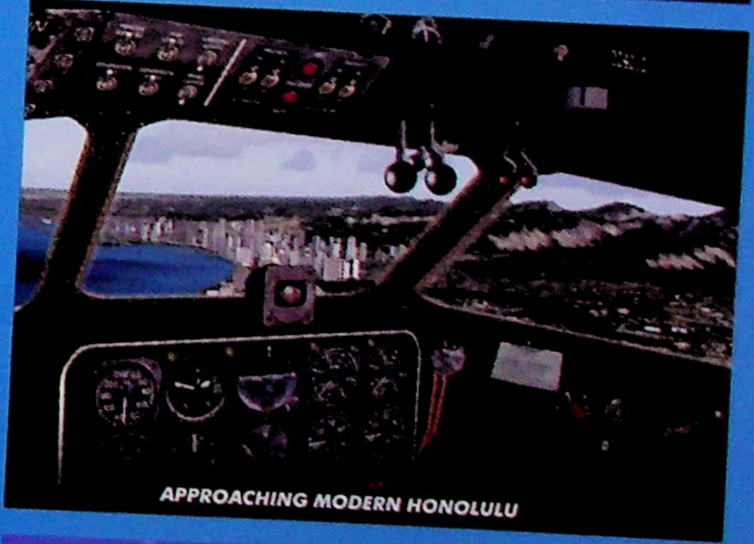
Kauai and Niihau

The island to the west of Oahu is Kauai, the "Garden Isle." The main airport is Lihue (lee-hoo-eh), which is on the eastern side of the island facing Oahu. If you haven't done so already, go to **avsim.com** and get Bill Melchar's scenery for the airport here (PHLI). Even from the ground, the views are a combination of the dramatic and the picturesque, with mountain peaks to the immediate south and a runway by the sea with a lighthouse at one end. The island is small enough - less than 30 nm at its widest point - that you can easily use this one airport as a base from which to explore the rest of the island. Take advantage, also, of those peaks that I mentioned: these form the Haupu Ridge, and when approaching from the other side of the island you can use them to find the airport.

From the air, the most striking features of Kauai are the tall bluffs of the Na Pali coastline (on the island's western face) and Waimea Canyon (which opens onto the south shore). Mark Twain, when he visited Hawaii in 1866, called it "the Grand Canyon of the Pacific." Although it's tempting, be careful not to fly too low into the canyon: it ends abruptly in the north, and there is no space in which to turn around.


ABOVE WAIKIKI

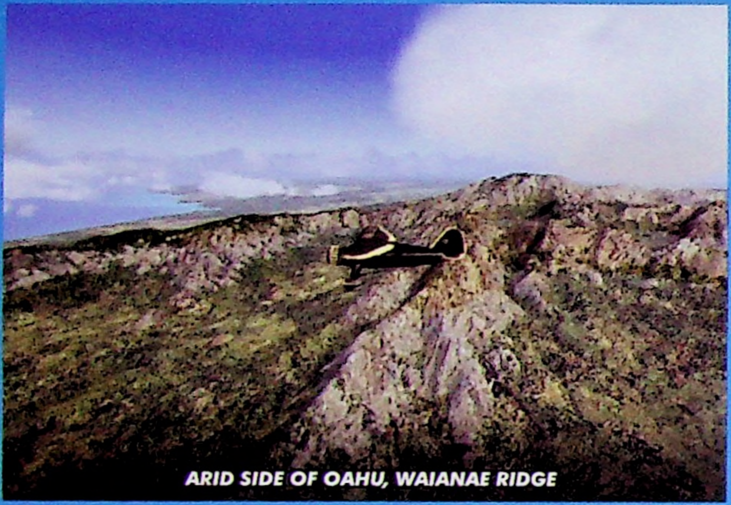

AI APPROACHING MAUI FROM EAST, NOTE MOLOKINI ATOLL IN MIDDLE TO THE LEFT


APPROACHING MODERN HONOLULU

APPROACHING MOLOKAI

ARID SIDE OF OAHU, SOUTH OF WAIANAE RIDGE

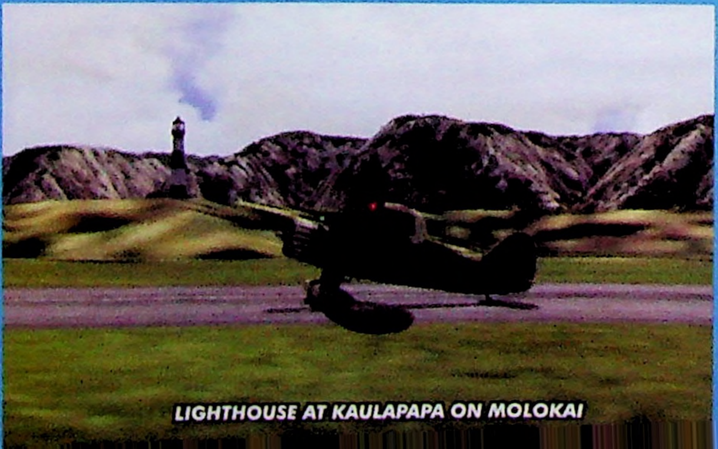
DESCENDING PARALLEL TO NE COAST OAHU

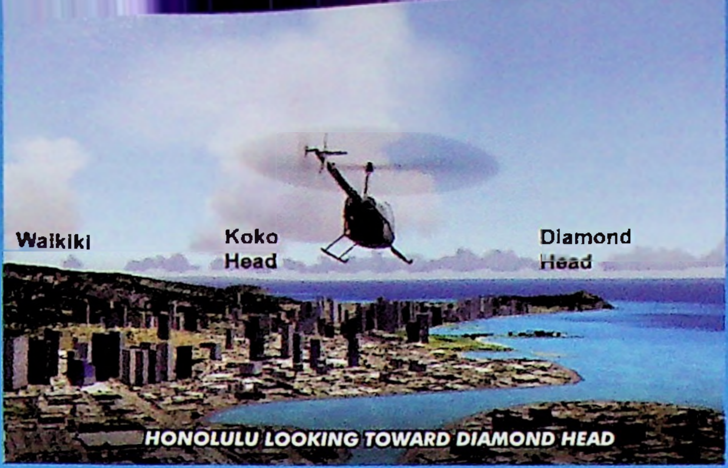

ARID SIDE OF OAHU, WAIANAE RIDGE

DOWNWIND RWY 35 AT LIHUE

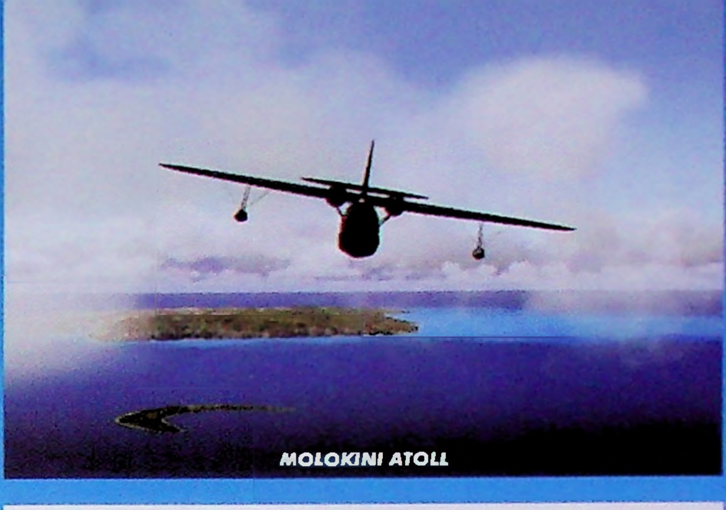
AT THE GATE IN HILO, MAUNA KEA OBSCURED BY CLOUD

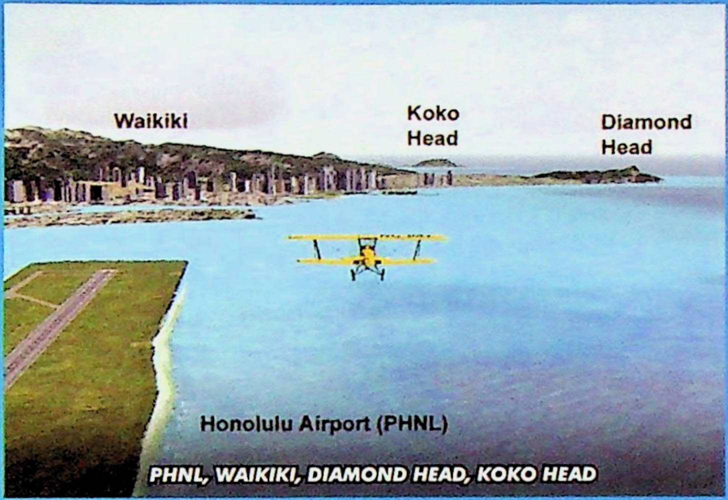
DRY SIDE OF KAUAI


LIGHTHOUSE AT KAULAPAPA ON MOLOKAI

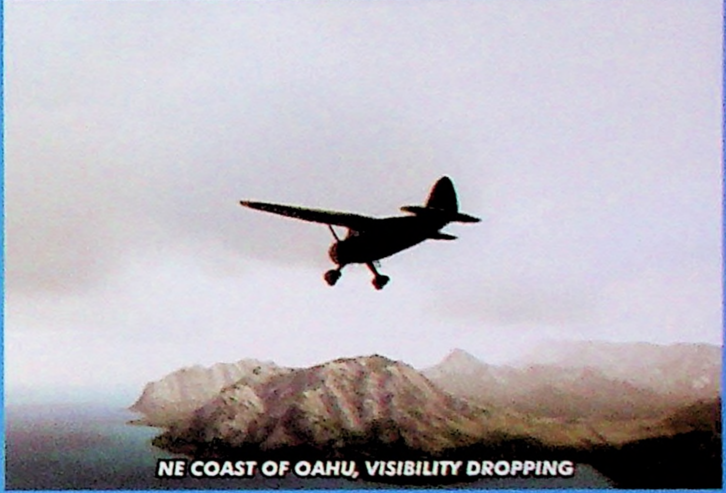


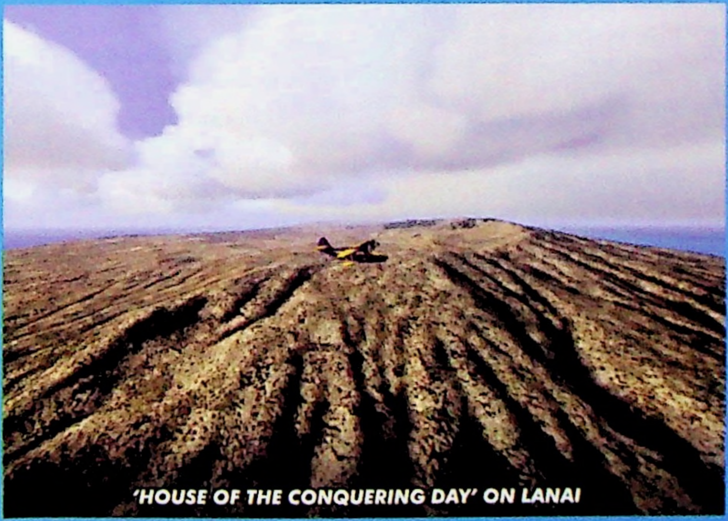
HONOLULU LOOKING TOWARD DIAMOND HEAD

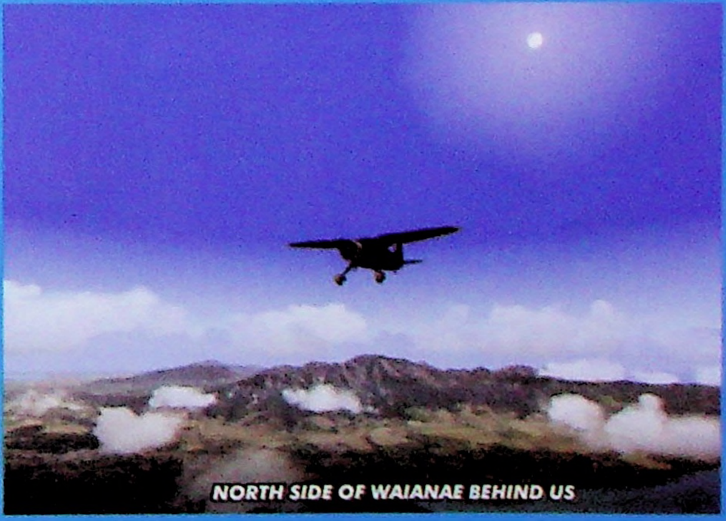

MOLOKINI ATOLL

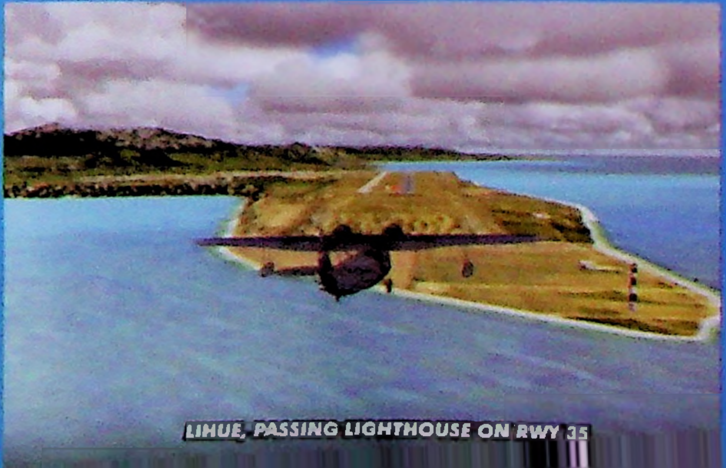


PHNL, WAIKIKI, DIAMOND HEAD, KOKO HEAD


NE COAST OF OAHU, VISIBILITY DROPPING


'HOUSE OF THE CONQUERING DAY' ON LANAI


NORTH SIDE OF WAIANAE BEHIND US


LIHUE, PASSING LIGHTHOUSE ON RWY 35

About 15 nm west of Kauai is the privately owned island of Niihau, known as the "Forbidden Island" because until a few years ago it was very difficult for outsiders to get an invitation. Now it is only moderately difficult. There are still no runways for fixed-wing aircraft. Also, there is no electricity.

Maui Nui

To the east of Oahu is a group of four islands: Molokai, Lanai, Kahoolawe, and Maui. At one point, the volcanoes that formed these islands actually merged to form a super-island known as Maui Nui ("Great Maui"). The island is sinking however, so that what look like four separate islands are, in fact, the mountain peaks of the old super-island.

The first island that you meet flying east from Oahu is Molokai. Less visited than Maui or Oahu, the "Friendly Isle" was once used as a leper colony. You can recognize it from the air by its long, thin shape running east and west, with mountains in the east and plains in the west. The main airport (PHMK) is in the center of the island.

Below Molokai, to the south, is Lanai, known as the "Pineapple Isle" or the "Secluded Isle." The airport at Lanai City is on the south side of the island, about 2 nm inland from the shore. Landing here is not hard but pay attention to the altitude. Most airports in Hawaii are located near the shoreline and therefore close to sea level. However, Lanai (PHNY) is about 1,300 ft. MSL. Take this into account when planning your approach.

Departing eastward from Lanai you will see, sloping down to the shore, the broad remains of a vast volcanic crater. This is by far the most recognizable land feature on the island and gives the eastern coast of Lanai a distinctive and powerful appearance. The mountain is called Lanaihale, a word that means, in Hawaiian, "house of the conquering day." This is because the mountain is in the east where the sun rises. Remember this because it can help you orient yourself. In the cockpit, look around until you can see the "house of conquering day"; when you find it, that will be the eastern side of the island.

Continue east and you will get to Kahoolawe. Until a few years ago, Kahoolawe was used by the U.S. Navy as a bombing range. Protestors put an end to that, but the island is still uninhabited and not very interesting from an aerial point of view.

Not to be missed, however, is the tiny, crescent-shaped atoll to the north of Kahoolawe, Molokini Island. An atoll is formed when the center of a volcano sinks down below the waterline and fills with sea water. The crescent shape is what's left of the crater rim. You can't land there, but you can take some nice looking screenshots.

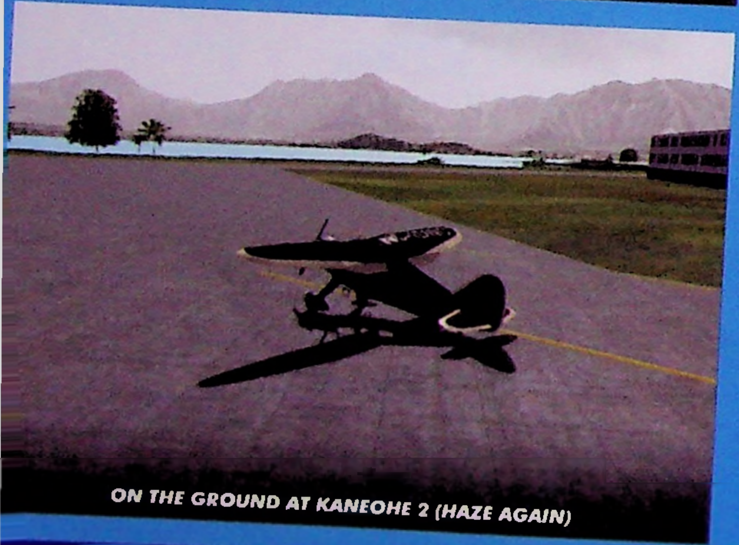
Just to the north of Molokini is Maui, which is one of those camel-shaped islands that I mentioned earlier. As on Oahu, you can use these humps to find the main airport, Kahului (PHOG). Just aim for the saddle between the two mountains and you will find Kahului nestled in the middle. (And how did Kahului get to be known as PHOG? The code was assigned in honor of one of the first commercial pilots in Hawaii, Capt. J. Hogg.)

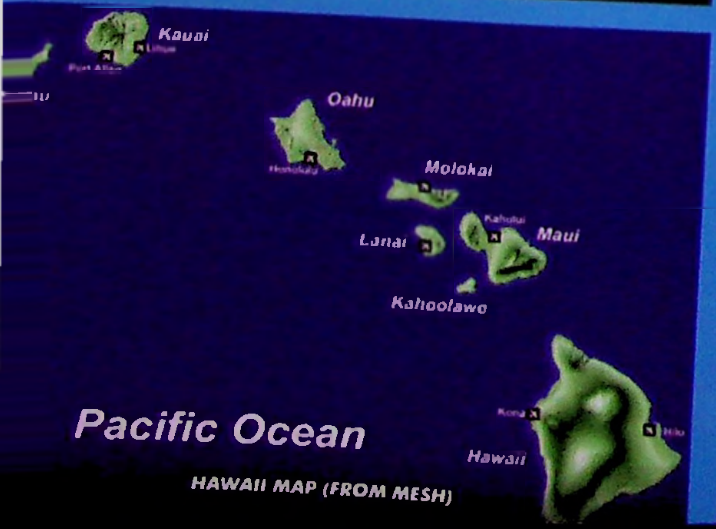
The Big Island

Continuing eastward, we come to the island known as Hawaii. Formed out of five volcanoes, eventually it will sink down and break up into separate islands like Maui Nui. In the meantime though, the Big Island is twice as large as all the rest combined. Like Oahu and Maui, it is roughly camel-shaped with one hump in the north and one hump in the south. The southern hump is named Mauna Loa ("broad mountain") and the northern hump is named Mauna Kea ("white mountain," because

OAHU RIDGES IN HAZE

ON THE GROUND AT KANEOHE 1 (HAZE AGAIN)


ON THE GROUND AT KANEOHE 2 (HAZE AGAIN)



HAWAII MAP (FROM MESH)

it is frequently snow-capped). In this case, however, the island's main airport is not situated in the middle of the two humps; instead, there is an army airfield (PHSF) and an all-season live-ammo exercise range.

Compared with the mountain ranges on Oahu the mountains on Hawaii can seem rather dull. This is an illusion of scale, and if you are planning to fly on the Big Island you need to get used to the fact that the two big humps are higher than they look: almost 14,000 ft. at the peaks, and between them a saddle of almost 7,000 ft.

In contrast, the highest point on Oahu is only 4,000 ft. Yet if you're standing on the ground the mountains on Oahu look bigger because they have been worn down by time to a series of sharp points. Visually, the effect is very dramatic: it looks like the mountains are soaring into the sky. The mountains on the Big Island are much younger and still have their "baby fat" on them, so that they have a rounded, easy-going appearance to them. Don't be fooled: if you plan on flying at the summits for more than thirty minutes, FAR 91.211 says you need to bring oxygen.

History and Place Names

If you like fiction and want to learn more about Hawaii's history, read James Michener's novel *Hawaii* (1959). If you're curious about what a place name means (e.g., "white mountain" or "house of the conquering day"), try the Hawaiian dictionaries at http://wehewehe.org/cgi-bin/hdict?l=en Type in the name and select "place names" from the results list. The last item for each entry will give the literal (Lit.) meaning of the name, with an explanation if necessary. My favorite place name in Hawaii is Alenuihaha, which is the rough channel between Maui and the Big Island; the name means "great billows smashing."

Climate Briefing

There's another reason that Mauna Kea (the tallest peak) looks shorter than the mountains on Oahu: because the mountain is so high (13,796 ft. MSL), there is usually a layer of cloud somewhere between summit and coast. As a result, the mountain top is often invisible from the ground.

This brings me to our second topic, weather. Again, instead of trying to cover every possible eventuality I will offer just two rules of thumb.

First, the winds in Hawaii usually come from the northeast. These are the famous trade winds. They are more reliable in summer than winter, but if you ever need to guess which direction the wind is coming from, the right answer will usually be "from the northeast."

Our second rule of thumb is actually a corollary of the first: on mountainous islands (and almost all of the Hawaiian islands are mountainous), the northeastern side of the island is wet and the southwestern side is dry. This is because the trade winds pick up moisture from the sea. When the winds encounter a mountain they deposit their moisture load, as rain or fog, on the windward side of the mountain. In contrast, the leeward side is dry, even desert. This is why, on the Big Island, there is often a vast difference between weather conditions at the two major airports. Kona (PHKN) is on the western (leeward) side of the island, and gets 8 inches of rain per year. Hilo (PHTO) is on the eastern (windward) side, and gets 128 inches of rain. Guess which town is more popular with tourists? Now, guess which airport receives more traffic from the mainland? (Hint: mainland flights to Hilo "International" Airport stopped in 1987. Also, someone should tell Microsoft ATC that it's pronounced "hee-low," not "high-low.")

Obviously, the wet/dry rule is useful for predicting flying conditions. But it also affects what you see on the ground. Generally speaking, the northeastern areas are wet and therefore you can expect to see green vegetation when you fly. Areas in the southeast are usually dry and therefore brown.

Let's apply our two rules of thumb to some more islands. On Oahu, the big surf is on the north shore, facing the trade wind. On the other hand, if sun is what you crave, go to Waikiki beach; you will find it on the southern shore of the island, where it is sheltered in the "rain shadow" of the Koolau mountain range. That is to say, the Koolaus block out rain, the way an opaque body blocks out sunlight. In fact, the name *Koolau* means "windward." Why? Because it is on the northeast side of the island and therefore faces the wind.

The wet/dry wind rule also applies on Kauai, which has an annual rainfall of 460 inches and is therefore the wettest place on earth. If you look at a map you can see why: there is nothing between it and the northeasterly trade winds to intercept their moisture. When they reach Kauai the winds deposit their moisture load as rain. Rain causes erosion, and this is why there are so many spectacular canyons on Kauai.

But rain and rainclouds are a hazard for pilots. Recently, I made a flight in the sim from the Barking Sands missile range facility (PHBK). Barking Sands is on the western side of Kauai in the rain shadow of Mt. Waialeale (5,148 ft.). When I took off, the weather was inclement but still flyable. When I reached altitude, the moisture in the air made for some beautiful fog banks which glowed purple in the dusk. However, when I got to Lihue, my intended landing site, the visibility had dropped to less than half a mile. Had the weather suddenly changed? No, I had just traveled to the windward side of the island: the wet side.

Unfortunately, I was flying an older plane and didn't have the proper gear onboard for an instrument approach. Instead of waiting for the weather to clear I made an educated guess and pressed on, following the coast until I reached Port Allen (PAK), which is back on the leeward side of the island. The weather at Port Allen was still bad, but not so bad that a landing was impossible.

To review: wind in Hawaii usually comes from the northeast, and so does rain. An extreme example is Niihau, which has an annual rainfall of only twelve inches. What blocks the rain is not a mountain: it's the whole island of Kauai, which intercepts almost all of the moisture from the northeast before it can reach Niihau. Some years there is so little water on Niihau that the whole population actually has to be evacuated to Kauai! All because of the trade winds and the wet/dry rule.

Now, stop reading and start flying. Choose an island and go exploring. Pick an airport and use that as a base. Look for landmarks that will help you locate the airport from the air. Notice what direction the wind is coming from, and look at the ground cover to see which side of the island you are on. Wet equals green, brown equals dry. Always wear sunscreen. ➜

Premier Aircraft Collection: PIPER DAKOTA

BY AL PELLETIER

Carenado is a company that specializes in designing small, single engine/four seat trainer and pleasure aircraft for Microsoft Flight Simulator. This is a total take-off from most of today's Flight Simulator aircraft designers, who are into creating medium to heavy passenger and cargo airplanes. In my opinion, there is a great market for the smaller IFR certified trainer type aircraft like the Piper Dakota.

Carenado offers quite a selection which includes a Beechcraft Bonanza F33A, a Beechcraft Mentor T34B, Bonanza V35, Piper Cherokee 180F, Archer II, Cessna Centurion and Cessna 182.

The Piper PA-28 is well-known for being one of the best IFR certified airplanes in the single engine/four seat category around. It features a low-wing profile and can sport a variety of engines between 150 and 235HP, along with a complete set of IFR avionics. It has been a favorite of flying schools all around the world. It is even used by large airlines like Lufthansa for IFR training. The PA236, successor to the PA235, of which 217 sold in the first year alone, has become one of the most prized and popular IFR training aircraft at flying schools worldwide. The 236 first appeared in 1979 and remained in production until 1994.

As for Piper, the Dakota is like the twin brother of the Piper Archer II. If you enjoyed flying Dreamfleet's Archer, you will love the Dakota.

By now, you've probably, already, figured out that I like this airplane, and from here on I'll tell you why. So please read on…

Package and Installation

The long-awaited boxed version falls under the name of *Premier Aircraft Collection: Piper Dakota* and ships on CD-ROM in a well-packaged DVD-style case with a printed booklet offering installation tips and basic aircraft checklists, which came in handy. The simple, menu based install was flawless and straight forward. The airplane came in only one livery but many more repaints have popped up at **www.avsim.com** and **www.flightsim.com**

There is also a great paint-kit available, so that you can change the livery to your own flying club colors. Look for the files **carenado_Dakota_paint_kit.zip** and **carenado_Dakota_paint_kit_fix.zip** by Frank Steffens. It is available for free at the same websites.

Documentation

The CD version has excellent documentation in TXT and PDF format. The original aircraft (real world) comes with a 100-page manual. Having said that, this is a simple one-engine airplane and nothing is overly complicated. The 12-page manual touches on system requirements, installation and history of the aircraft. You'll also find performance specifications on items like horsepower, gross weight, top speed, stall speed, range etc. These are all important and a big help in learning how to handle a certain airplane type. I like to test the plane and performance to see if everything matches. In this case, it hit the numbers to a good level of accuracy. Yes, the real 100-page manual would be nice, but I think that the one included here is totally sufficient for flight sim purposes, and helps in keeping the price down. You'll also find a very useful checklist printed out in the printed leaflet. The checklist is also available in the cockpit while flying, or in PDF format included in the package.

The Exterior

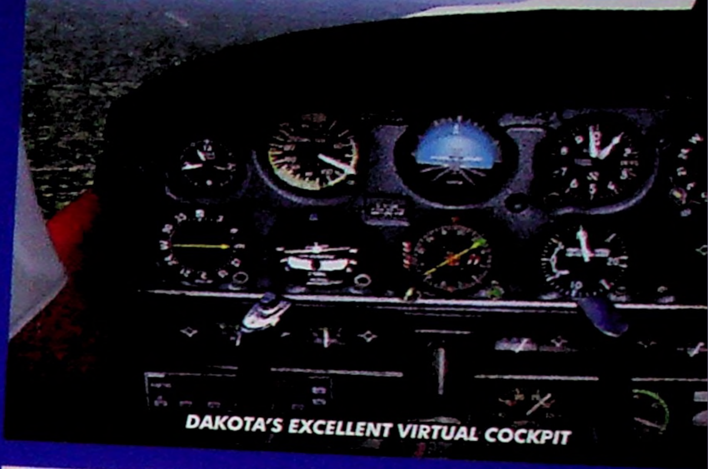
The exterior fuselage appearance and paint are accurate, pleasant and very authentic. Modeled with Gmax, Carenado gives us very realistic animations. The flaps, ailerons, elevator and rudder work perfectly from the outside view. The paint reflects the sunlight as you pan around the outside view. The night lighting is also realistic. The navigation lights reflecting onto the wing surfaces makes you think that you are in the real plane. Nothing looks out of place. The gas cap, the rivets, window contours, wheel covers, flaps and other control surfaces are all very detailed and accurate. The door opens (Shift-E) to let you and your passengers in. The propeller and spinner change in view and appearance when the RPM is revved up or down. All the little details are there. You know, "these little details" that you normally notice right away when they are not there. In this aircraft these same details blend right in without being noticed. Kudos to the development team.

Main panel

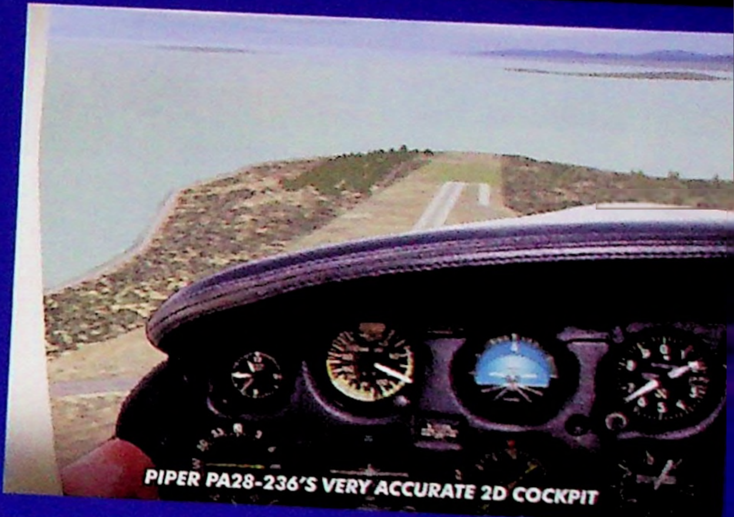
The 2D panel is very accurate. The black leather around the instruments has the stitching "built in" like in the real plane. The instruments are located where they should be. I compared it to the real Dakota panel and I couldn't find anything out of place. Carenado even placed the different "views" button, at the top left of the outside view, so not to spoil or change the main panel.

The gauges are clear, sharp, bright and easy to read. No fuzzy pixels here. The outside view is also accurate. You can see over the engine and have great visibility ahead (if you're not in cloud).

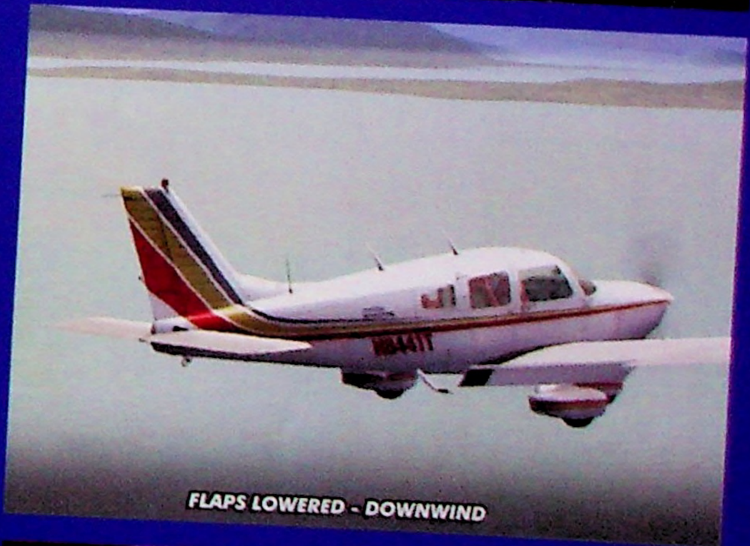
The "virtual cockpit" is also impressive. It is fully-functional. This is the key word. I judge a virtual cockpit to be "functional" by answering these two questions: can I and do I want to fly from this view? The answer here is "Yes". The gauges are very sharp and easy



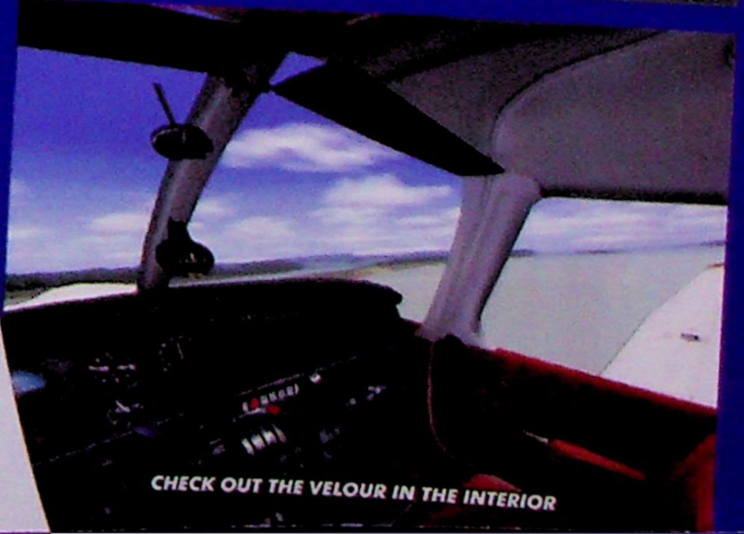
DAKOTA'S EXCELLENT VIRTUAL COCKPIT



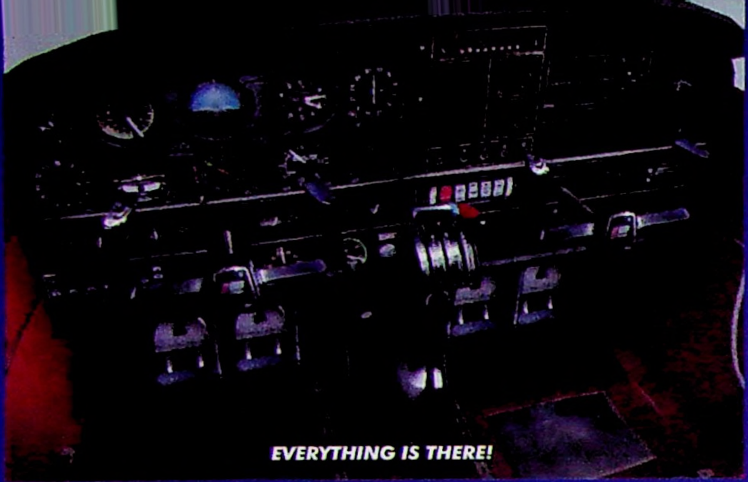
PIPER PA28-236'S VERY ACCURATE 2D COCKPIT



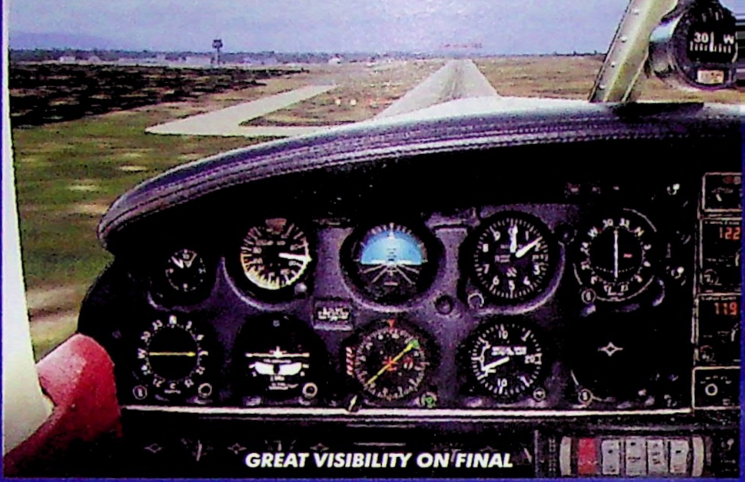
FLAPS LOWERED - DOWNWIND



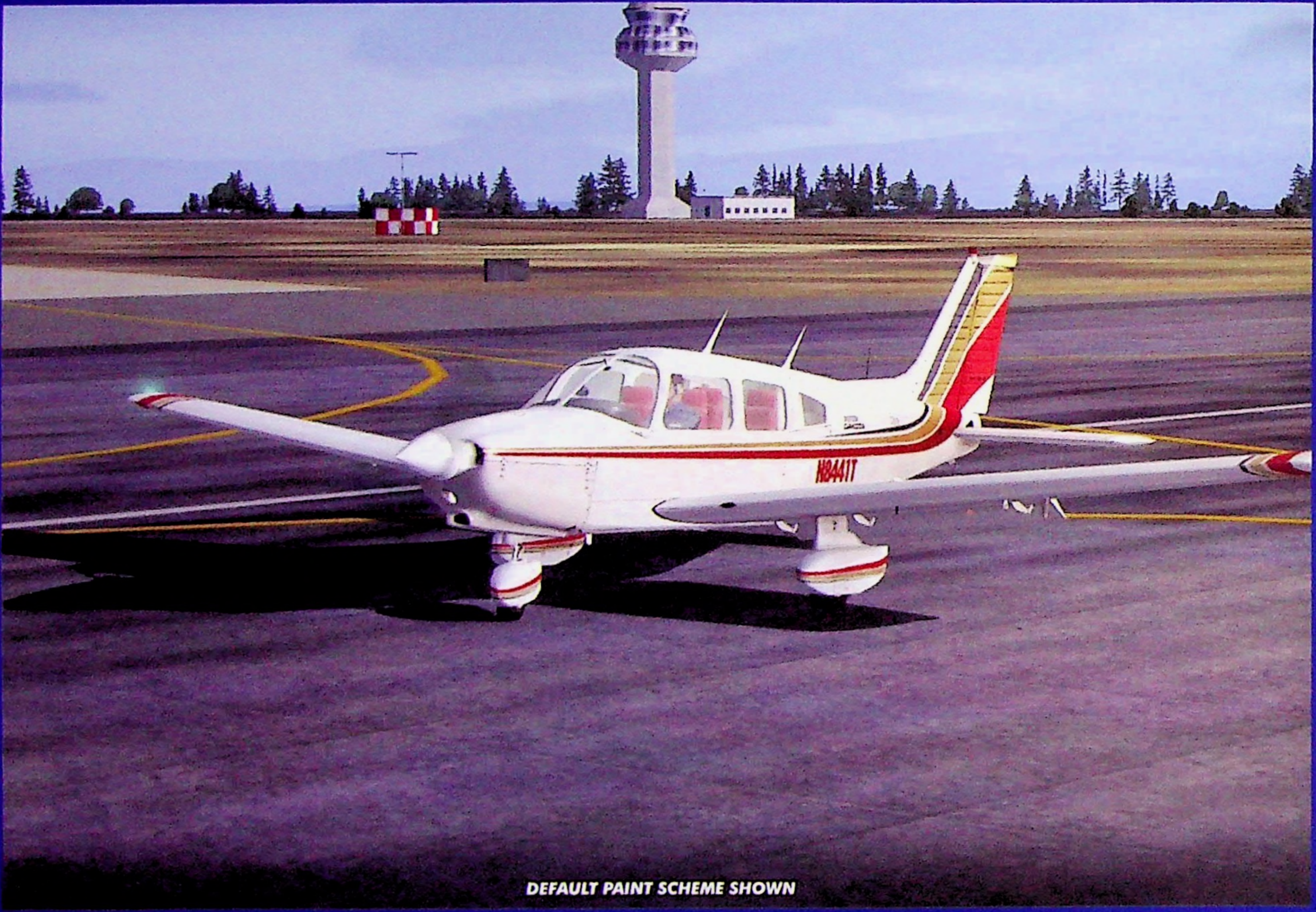
CHECK OUT THE VELOUR IN THE INTERIOR



EVERYTHING IS THERE!

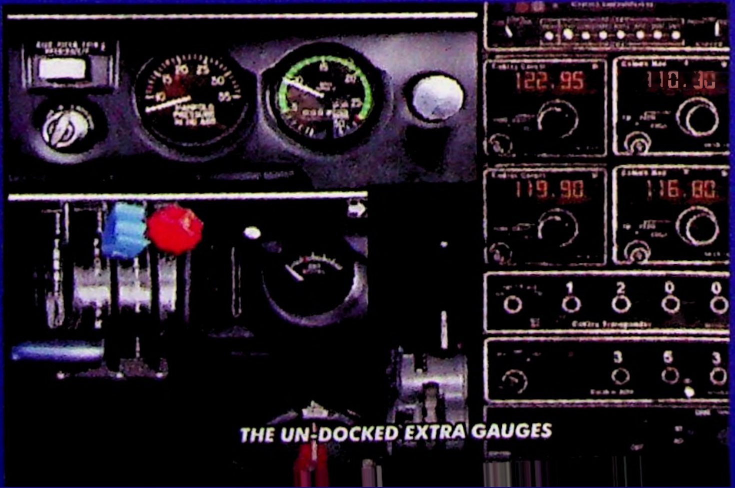


GREAT VISIBILITY ON FINAL

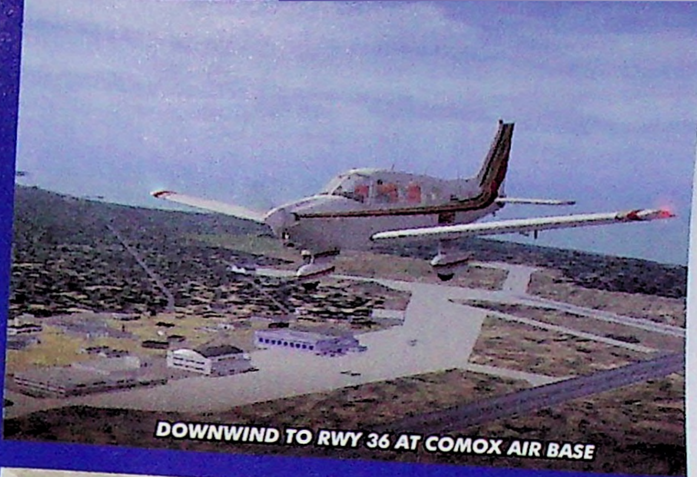


DEFAULT PAINT SCHEME SHOWN

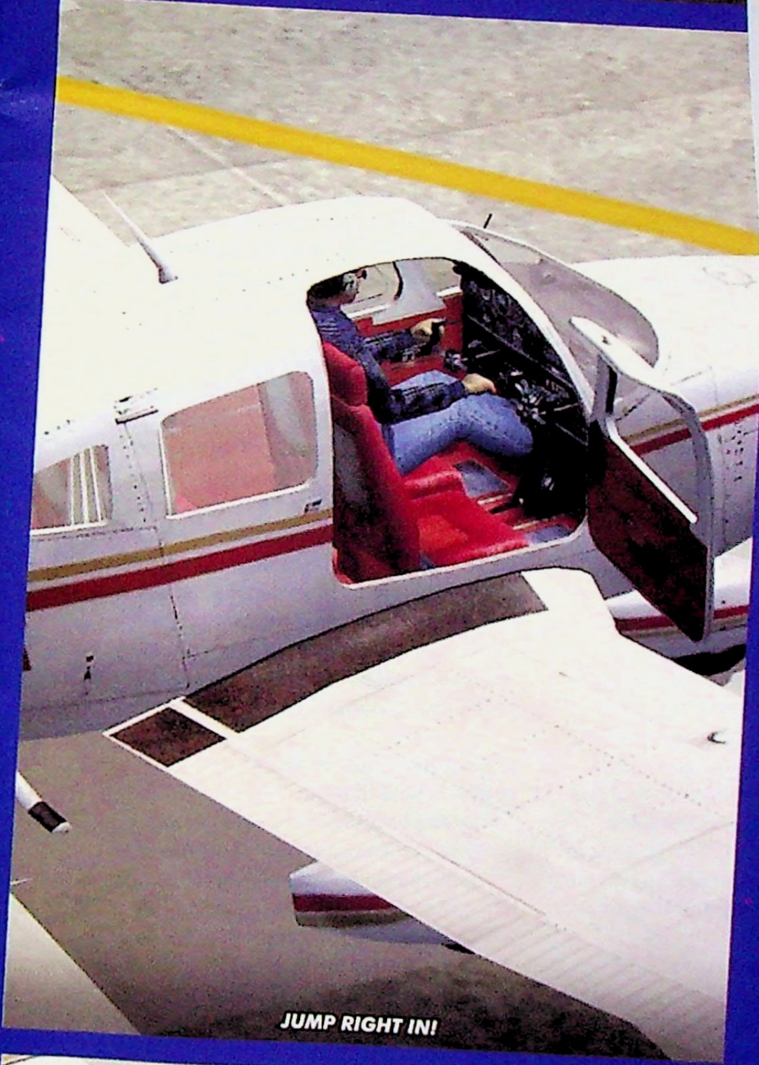
LOOKS GREAT FROM ANY ANGLE!



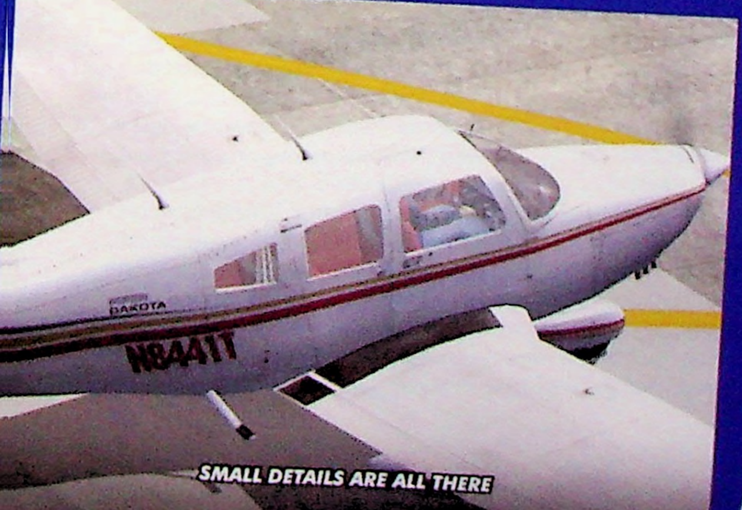
THE UN-DOCKED EXTRA GAUGES



DOWNWIND TO RWY 36 AT COMOX AIR BASE



JUMP RIGHT IN!



SMALL DETAILS ARE ALL THERE

to read. You can also pan to outside views and all around the cabin. The colors of the upholstery on the velour seats and door (there is only one) and around the windows are soft and very life-like. You can see the yoke move and the rudder/brake pedals are also fully-animated. What stands out here is, again, the true-to-life textures. Zoom in and out and have a look at the entire cabin. A little trick that I use is to "move point of view right or left" while in the "virtual cockpit" and this allows me to move into the co-pilot seat.

Flight characteristics, sounds, and other details.

I put the aircraft through some really hard testing. It stalled at 56kts with flaps down, just like advertised. It recovered nicely with gentle push down on the yoke and gradual power up. With just one person on board it really jumped when I applied full power. The 235HP engine is very quick and responsive. Pilot training around an 1800 ft runway was a lot of fun. I took it on a training flight that is done here locally and used the published procedures for the small Courtenay Airpark, first crossing mid field at 900' and joining with left hand circuits. I have done this for real hundreds of times in a Cessna 172 and the Dakota didn't let me down. The trim worked well and I could adjust my rate of descent with power, and setup for a proper landing speed with full flaps applied.

I then proceeded to the Comox Air Base, and after lowering the weather, proceeded with some instrument (ILS and NDB) approaches. Again everything worked well. I increased the challenge with crosswind (I have rudder pedals) and some heavy rain. The airplane responded appropriately.

The sounds are as accurate as heard on a real single engine with this amount of horsepower. You hear that powerful bass and rumble when you power up. Yet the cabin is pleasantly quiet at cruise speed of 143kts. One sound that stood out as being so real was the stall horn.

What I like about the Dakota PA-236

1. **Easy install and good documentation.**
2. **A+ cockpit in both 2D and "virtual".**
3. **Engine sounds are very realistic.**
4. **Outside textures and animation.**
5. **True-to-life cabin and textures.**
6. **Great flight characteristics, dynamics and handling.**

What doesn't work and needs improving

1. **Not much. Maybe just a bit more "hear candy" with clickable buttons/switches.**

Conclusion

This is a "must have" airplane for pilots who want a good GA trainer. I very much enjoyed flying this versatile aircraft. It can be used for VFR flying, VOR navigation, or as an instrument and procedures trainer. I can see why so many flying clubs fly the Piper Dakota. I re-discovered the pleasure of flying a single-engine plane and departed from the heavies for a while. My hat's off to the Carenado team and PC Aviator for putting out such a great product.

The Dakota can be purchased from most good sim stores or direct from PC Aviator – **www.pcaviator.com**
Price at time of writing was US$22.95 for the CD version.

WHAT FLIGHT SIMMERS DO

SEEKING WHAT WE DIDN'T BUY

Flight Simmers See Beyond the Package

BY BILL STACK

How many of us flight simmers knew what we were luring ourselves into when we bought our first flight-simulation program?

When consumers stand in computer-game stores and look over the products, they think of themselves playing the games as shown on the packages. They imagine themselves building cities, shooting enemies, playing football, flying airplanes, and who knows what else. They even see themselves being drawn into the pictures on the box.

When consumers interested in simulating flight look over the packages of flight-simulation programs, they think of themselves flying airplanes or fighting other aircraft in battle. Many imagine themselves controlling huge jetliners across oceans to the world's busiest airports. Some see themselves flying small float planes in remote mountainous regions far from civilization. Others think of shooting military targets and evading shots from their equals on the other side of battle.

I don't think many consumers of flight-sim games browse through retail stores and imagine themselves doing what a lot of flight simmers do. I certainly didn't. Based on available add-on hardware and software as well as magazine articles, newsgroup posts, and Internet blogs, flight simmers appear to do more of everything except actually simulating flight! A remarkable amount of time is devoted to making products for other flight simmers to spend their time using.

Scenery supplements for nearly every square meter of the Earth have been made by companies and individuals. Some of these developers have made sceneries that cover broad areas and include major elements such as airports, radio-navigation aids, and significant geography. Others have made sceneries that cover small areas and include tiny items such as wind socks, fuel pumps, automobiles, and even boats. Sceneries for major cities such as New York and London have been made, as have sceneries for remote areas such as the Canadian arctic and the South Pacific islands. Corrections, improvements, and updates to previously issued sceneries or to sceneries developed by others have been made.

A lot of time is invested by flight simmers who make detailed scenery elements such as unique buildings, modern bridges, skyscrapers, and expressway interchanges. One download site has a whole section just for "gates and taxiways."

A miscellany of supplemental aircraft that would rival the Oshkosh, Wisconsin, airshow has been created by innumerable commercial and private developers. Everything from ultra lights to the new Airbus A-380 behemoth has been made. So many aircraft of so many types have been made that file-sharing sites group them into categories such as "jetliners," "warbirds," and "helicopters." They are also grouped according to the flight-sim program they were made for, such as "FS2004," and "FS2002." The cumulative hours invested in creating these aircraft could exceed the hours needed to design and build a real A-380 by many times. Even more time is devoted to making details such as moving doors and smiling occupants.

Quite a few artificial-intelligence aircraft and flight plans have been made. The aircraft require the same skills, effort, and time as any other flight-sim aircraft, and the flight plans are even more work. Hours are spent plotting the paths these aircraft will follow in the skies.

Aircraft panels and gauges are software items that take copious time and reflect substantial planning and testing. Every conceivable gauge, including better models of default gauges, have been made by commercial and private developers. Quality conscious developers take the time to make sure their gauges interact correctly with the simulation program and look and behave like real-world gauges.

Adventures that challenge and thrill flight simmers are created to challenge and thrill other flight simmers. "One terrible morning," writes a simmer in his adventure description, "you bet your daredevil friends to bring the Schweizer 2-32 sailplane to the airport somehow. It's raining and the wind is at its high pace favoring the opponents and your sailplane is brought over the raging sea about ten miles from the airport."

A cacophony of real aviation sounds that please flight simmers' ears such as whining turbojet engines, ferocious propeller blasts and banging cargo doors have been recorded at considerable expense of time and effort.

These creative flight simmers make more than sceneries, or sounds, or gauges, or whatever. They also spend time writing instructions, penning colorful descriptions, and making attractive images to tout their creations. Makers of historically significant sceneries write brief histories so simmers can maximize their time spent using them.

Simmers who make software to enhance default air traffic control features find a ready audience for their products. They write complicated programming and provide realistic voices with national and regional accents. All are in English, of course, because it's the standard for aviation around the world.

Programs enabling flight-simmers to spend their time making other add-ons have been made. Simmers can spend more simming time using such software to make aircraft, sceneries, and panels, and more.

Aviation charts adapted for flight simulation are made and offered free by many simmers. Some companies adapt their professional charts for flight-simulation use, for a price of course. A few simmers compile aviation data such as names, frequencies, and locations, of airports and radio-navigation aids. I don't have time to chart or tabulate the amount of time invested in these endeavors.

A surprising number of simmers build full-scale cockpits in their basements or garages. The photographs they share reflect considerable planning and carpentry skills as well as countless hours of design and construction. One simmer admits to spending 10 years building a home-built cockpit.

Real yokes and rudder pedals, high-tech joysticks, and scale replica instrument panels have been made for cockpit builders to spend time installing in their creations.

Flight-sim entrepreneurs operate numerous businesses that manufacture and sell hardware, software, and publications. They make and sell everything flight simmers need or want for maximizing the experience.

Simmers with requisite skills and time to build and manage websites have made hundreds of sites devoted to flight simming. While some of those websites operate as commercial enterprises with advertising and membership revenues to sustain the operating costs, most are private operations funded voluntarily by their operators and users. Most of these flight sim websites, whether commercial or not, reflect a major investment of time and effort in design, construction, and operation.

Entrepreneurial flight simmers with knowledge of writing and publishing write and publish magazines and books about flight simming. Where there were at least four magazines devoted to flight simming, we now know of only two still in regular publication. Numerous books and articles about how to operate flight sim games and simulate flight realistically have been written.

Simmers with knowledge of how to operate a simulation game or how to fly an aircraft spend time sharing their knowledge with others through books, magazines, and website postings, all of which requires copious time.

Visually oriented simmers make flight sim videos to demonstrate flight techniques or just for entertainment. Either way, making good flight sim videos easily consumes many times more time than watching one. A short video I made to run as a backdrop for my 20-minute presentation at a flight sim conference took several days to make. Some simmers have formed businesses just to make "professional quality" flight-sim videos.

Making good shots of the flight sim screen can be like good photography. Knowledge of composition and lighting is important, as is the willingness to invest enough time to do the job well. Quite a few simmers spend sufficient time to make and share excellent screenshots.

What is known only to those who spend time tracking such data is the number of people who spend time on the Internet. They surf for flight simulation products and information, read that information online, participate in online discussions, and upload or download files related to flight simulation.

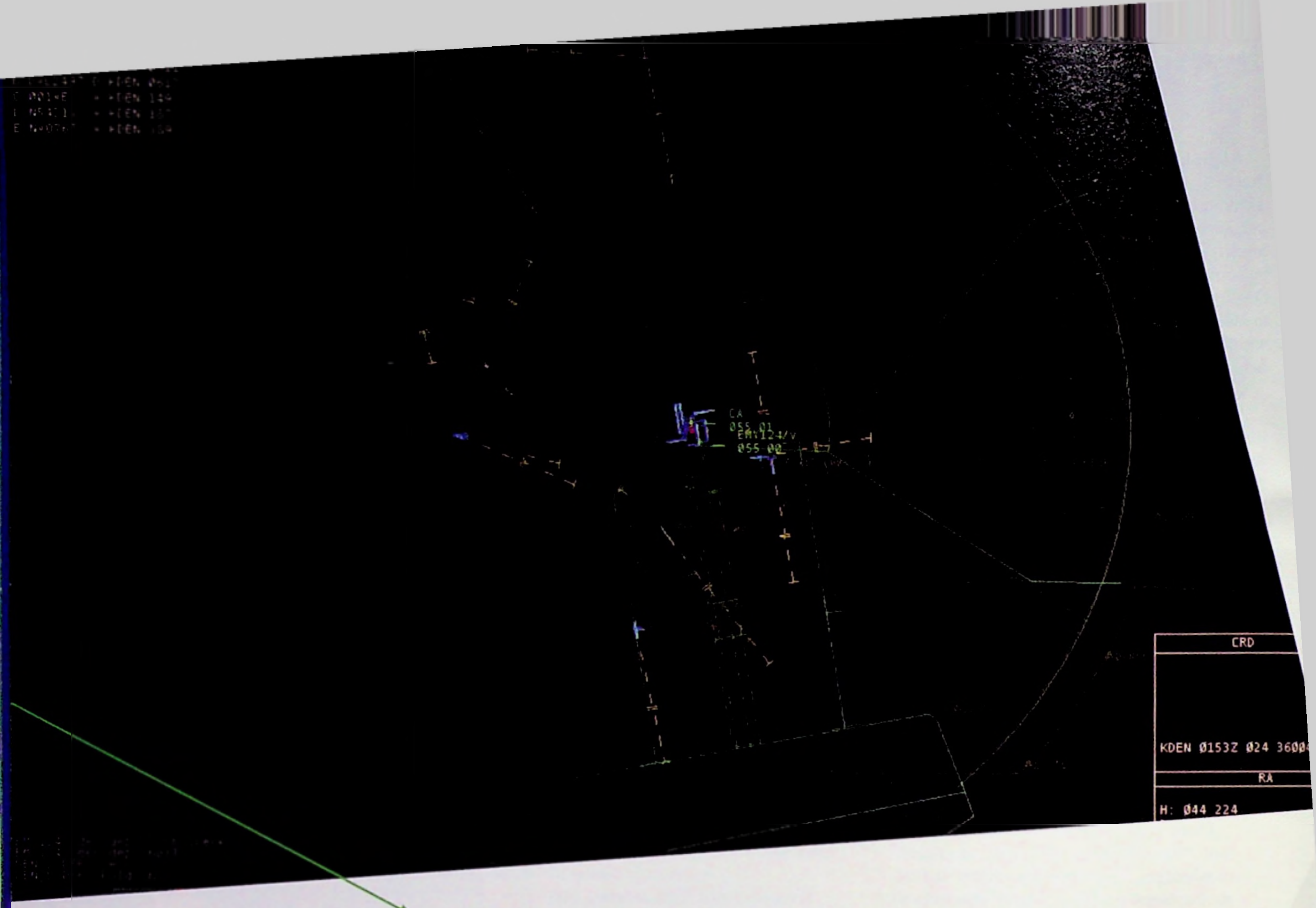
Judgmental simmers (who have opining genes in their cells) enjoy time spent evaluating flight sim products and writing reviews about them for pay or free. Even simmers who want to express opinions in general can find forums in the op-ed sections of some flight-sim websites. Topics range from gripes to accolades and include sharing of simulation experiences.

All this time spent using the Internet, making and selling add-on products, and writing books and articles is time not spent simulating flight. Don't you wonder how much time some people spend on actually simulating flight when you see the detail of their work in their creations? I seriously wonder about "simmers" who have been posting the Internet newsgroups daily for years. When do they simulate flight?

I'm obviously among those simmers who spend a lot of flight sim time without actually simulating flight, but I spend at least an hour daily simulating flight somewhere, somehow, just to keep my skills at peak levels. As a writer of books and articles about how to simulate flight realistically, I must keep myself at the top of my game just like any professional.

Are these people flight simming or not? In the literal sense, no, but they are indeed contributing substantially to the simulation experience and expanding that experience for others. So whether they're actually at their simulators simulating flight or doing any of these other activities supporting flight simulation, it's really hard not to call them flight simmers.

Bill Stack is an expert flight simmer, a management consultant and a professional writer, speaker and trainer based in Knoxville, Tennessee, USA. He has authored several books and numerous articles about flight simming. His books are available from quality flight-sim suppliers such as PC Aviator at **www.pcaviator.com**, and he can be contacted at fsbooks@topskills.com →



Who's In Control?

An Overview

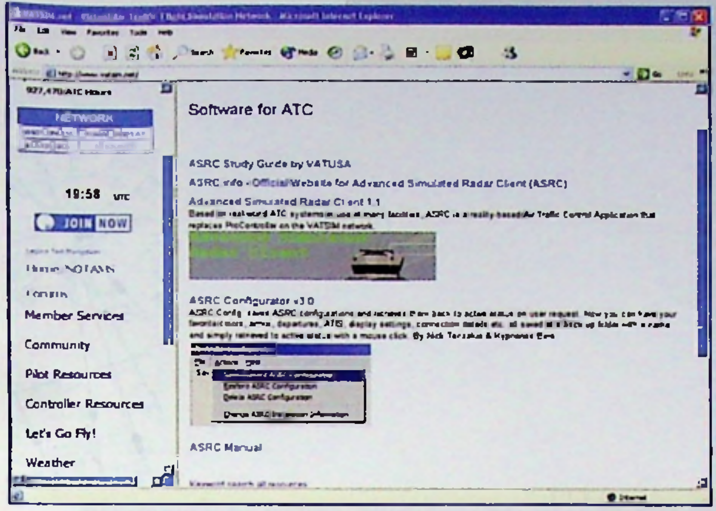
BY ROGER CURTISS

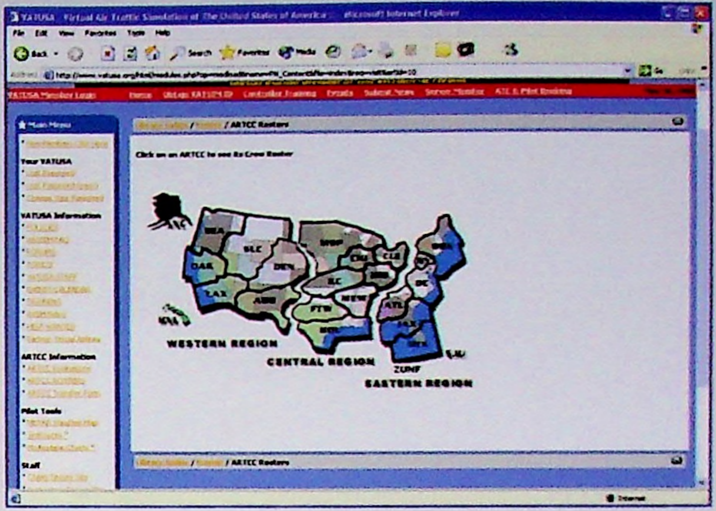
As was mentioned in a previous article (*CP Vol. 9 #6*) the requirements to function as an air traffic controller online are significantly greater than what are necessary to be a pilot. Perhaps the biggest disparity between the two roles is that the pilot is responsible for the aircraft but the controller is the guardian of all of the aircraft that are in his airspace. Some might even argue that it is more difficult to be a controller as there are no "ATC autopilots" whereby a controller can turn a knob and traffic is automatically kept separated.

This is not meant to minimize the challenges of the piloting task but is a recognition that the pilot's role is to execute the instructions provided by the controller, therefore it is incumbent upon the controller to know when an aircraft should initiate a descent and when to order the aircraft to turn to intercept a localizer course. And while the pilot needs to be accomplished in his knowledge of the characteristics of the aircraft being flown, the controller must maintain an awareness of the performance factors of all of the various types of aircraft under his guidance and factor in those performance abilities and limitations when issuing instructions.

In order to properly and efficiently engage in this role the controller needs considerable education and training and the online air traffic control networks, **VATSIM** and **IVAO** being the most prominent, recognize this responsibility and have instituted detailed training programs to produce qualified controllers.

Compliance with the training requirements is verified by written and online practical testing to ensure that students are indeed knowledgeable and proficient. Many of the Air Route Traffic Control Centers (ARTCC's) impose position restrictions that bar new controllers from controlling at a level beyond their proven capabilities. This creates a better experience for all involved as the pilots receive quality ATC services and the controllers do not get frustrated by finding themselves in over their heads. There is also an informal but extensive peer review process in place as pilots (many of whom are also controllers) are not hesitant to report to ARTCC management if they have received service from a controller who does not seem to be qualified.





Getting Started

A new controller trainee in VATUSA, the VATSIM operation in the United States begins by registering with VATSIM at **www.vatsim.net** to obtain a Controller Identification (CID) number and becoming a student controller and downloading the free Advanced Simulated Radar Client (ASRC) software for the radar display. The student then selects one of the twenty two ARTCCs to join by reviewing the evaluations on the VATUSA website - **www.vatusa.org** - and selecting one that is a good "fit". Most trainees select a geographical area with which they have some familiarity or for the opportunity to work an airport area in which they have an interest.

The ARTCCs for the United States are:

Albuquerque
Anchorage
Atlanta
Boston
Chicago
Cleveland
Denver
Fort Worth
Honolulu
Houston
Indianapolis
Jacksonville
Kansas City
Los Angeles
Memphis
Miami
Minneapolis
New York
Oakland
Salt Lake City
Seattle
Washington DC

Once placed on the roster of the selected ARTCC the student will be introduced to the training guidelines of that ARTCC. This training will encompass standard reference material provided by the VATUSA Training Department supplemented by information, charts and diagrams of that area's particular airspace. In this way, the student learns the basic control techniques and phraseology used by all controllers and then how to utilize those techniques within the airspace and procedural requirements of the local area of control.

Because there is a great deal of information to assimilate the new controller may be restricted initially to working certain positions and then progressing to busier and larger control areas. The "entry level" position is usually Clearance Delivery. This position bears the responsibility of reviewing submitted flight plans and then issuing clearances based on the pilot's requests and the procedures utilized by the ARTCC. For example, a pilot might request an initial waypoint on the flight plan and not be aware that particular navaid or intersection is used as an approach fix or there may be SIDs and/or STARs *(see CP Vol 9 #4 for a detailed explanation of these procedures)* in effect. It is the responsibility of the Clearance Delivery controller to amend the flight plan with the correct waypoints and communicate that and any other changes to the requesting pilot.

Clearances are issued using a standard format of **CRAFT**

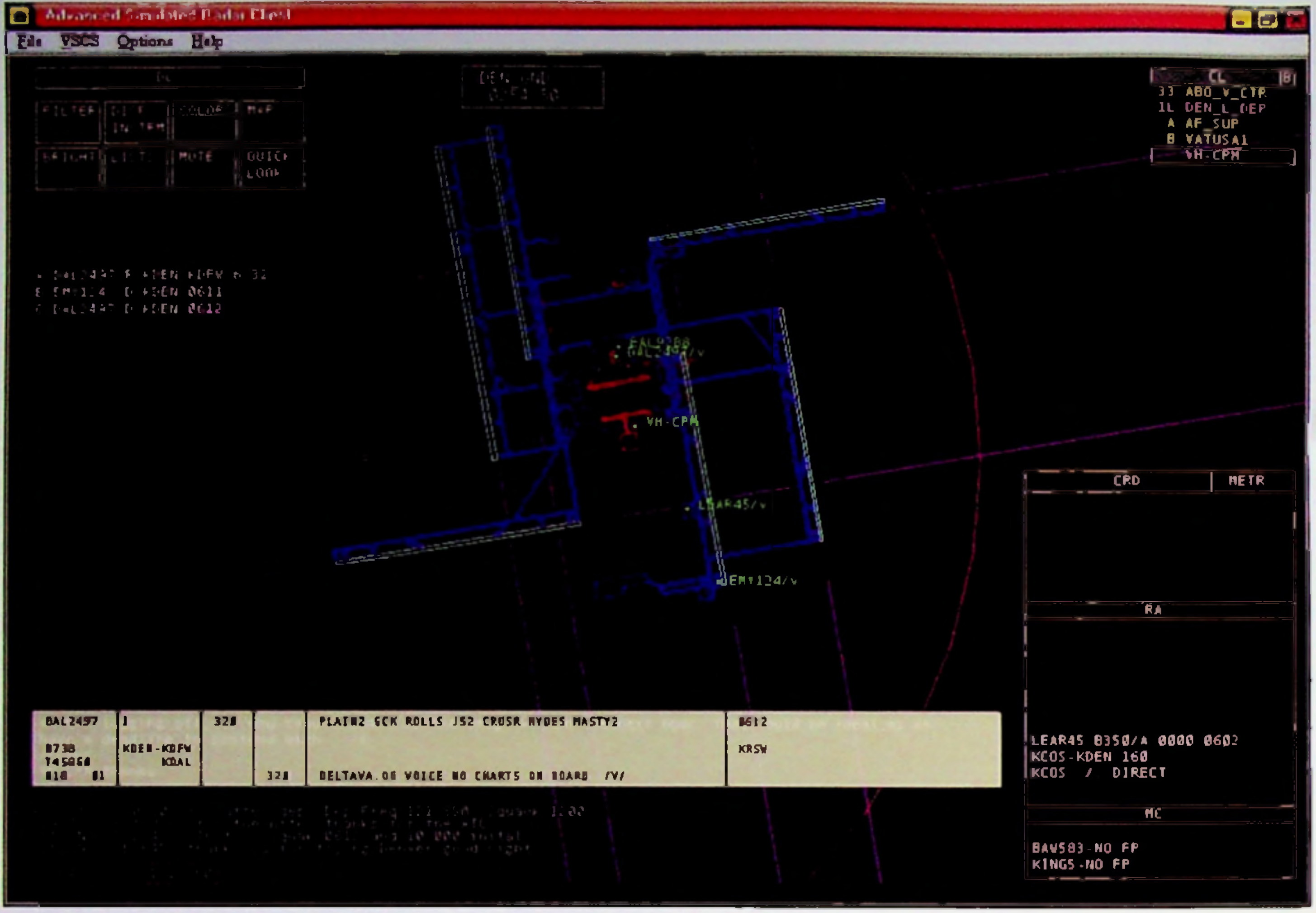
C= Clearance Limit. Usually the clearance will be to the destination airport but occasionally; for instance if there is a large amount of traffic converging on one airport, the clearance limit may be to a navaid or intersection in the area of that airport and then controllers at that facility will issue further instructions to the arrival airport.

R= Route. This is the route of flight indicating the first waypoint and subsequent routing beyond. In most cases there will be few if any changes to the route requested by the pilot and the clearance will be issued as "Cleared to xxxx as filed."

A= Altitude. This will usually be two altitudes. Initial temporary altitude is given first followed by the final assigned cruise altitude. The temporary altitude will vary depending on local procedures and how many control positions are being manned. Usually, the more controllers working, the lower the initial altitude as each controller is responsible for a smaller area of airspace and clearances will be to the limit of that particular controller's area. In practice, pilots should be handed off to the next controller prior to reaching any temporary altitude so that the radio switchover is complete and the aircraft can be cleared above that altitude without interrupting the climb.

F= Frequency. The radio frequency of the departure controller. This will be whatever control position is occupied beyond the Tower position. The pilot should have that frequency dialed in as the Comm1 standby frequency but not switch to it until instructed to after takeoff.

T= Transponder. The 4 digit transponder code. Codes are usually assigned automatically by the control software at the time the controller opens the flight plan. However the pilot must dial in the code to the transponder once it has been provided by the controller.



```
BAL2497  I          320       PLAIN2 GCK ROLLS J52 CROSR HYDES MASTY2   0612
B738     KDEN-KDFW
T45060        KDAL                                                        KRSW
010   01               320    DELTAVA.06 VOICE NO CHARTS ON BOARD  /V/
```

```
33  ABQ_V_CTR
1L  DEN_L_DEP
 A  AF_SUP
 B  VATUSA1
    VH-CPM
```

```
LEAR45 B350/A 0000 0602
KCOS-KDEN 160
KCOS   /   DIRECT
```

```
BAW583-NO FP
KINGS-NO FP
```

BOBBY COSGROVE WORKS THE GROUND POSITION AT DENVER INTERNATIONAL USING THE ADVANCED SIMULATOR RADAR CLIENT SOFTWARE.

The Clearance Delivery position offers an excellent learning environment for the new controller as the controller must know the appropriate initial departure fixes, any preferred departure routes to various destinations, and be mindful of the compass direction of a route to determine the proper assigned cruise altitude. These are basic skills that will be utilized while working more advanced positions and make for a very competent controller.

Once a controller has demonstrated knowledge of these basics the next progression is to learn Ground and Tower positions. In many instances the training for these can be combined as it is rare in the online world to have so much airport surface traffic that a separate Ground position is needed. In practice a Ground controller will often also take the duty of issuing clearances.

The Tower controller is the first position wherein the controller is actually giving control instructions to airborne aircraft. The Tower controller's primary responsibility is the runway surface area and the area approximately 5 miles around the airport up to 3000'. Controllers should always be seeking ways to maximize the efficiency of operations. The Tower controller must be aware of the varying performance abilities of different aircraft and their effect on operations. Since only one aircraft may conduct operations on a runway at any time the Tower controller must be aware of the best ways to utilize that precious piece of real estate.

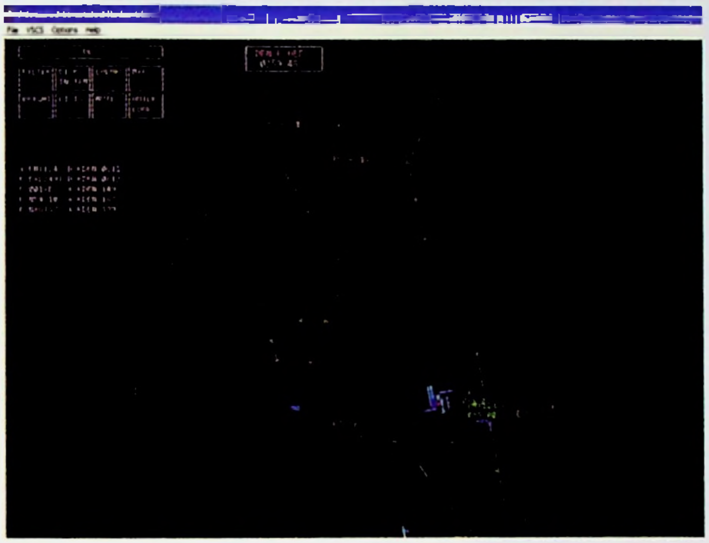
For example, say a Cessna 172 and a Boeing 767 are both requesting to depart from the same 10,000' runway. It would be most efficient to have the Cessna takeoff from a taxiway intersection at the 5000' point while the 767 continues to taxi to the end of the runway. That way, the Cessna, which does not require the full length of the runway for departure, can be airborne before the 767 is in position for takeoff. Otherwise, the Cessna might have to follow the much larger aircraft to the runway and then wait at least 2 minutes after its departure to avoid a wake turbulence encounter.

If the airport has multiple parallel runways, say 9L and 9R the controller should endeavor to have aircraft depart from 9L if there route direction is between 271 and 090 degrees and from 9R if their course will be 091 to 270 in order to avoid crossing flight paths which would unduly complicate the departure process and possibly jeopardize flight safety.

Tower controllers are generally dealing with traffic that is either traveling in a straight line (arrivals and departures) or in a very predictable and stable manner (traffic patterns) and are striving to accommodate the traffic for runway use.

Approach control may be the most difficult and intricate position as it is the responsibility of the approach controller to arrange the arriving traffic into those neat straight lines for the tower controller and to take the lines of departures directing them to the departure fixes and on their way up and out of the approach area. The approach controller is the "middleman" between Tower and Center and must work with them to regulate the traffic flow so that no one is overloaded.

To accomplish this, the approach controller needs to take advantage the basic tools of the controller which are vertical spacing, lateral spacing and speed control. Any one of these or a combination can be used to ensure separation of aircraft and an orderly flow. The key to successful approach flow is to know from where the traffic is coming and have a plan as to where it will go. The first part of the plan is maintained by the use of approach fixes - designated VORs or intersections (typically four of them - one in each corner of the approach area airspace "box") through which all traffic will be handed off from Center to Approach. By limiting the locations where traffic will arrive the Approach controller can have defined corridors through which this traffic will travel. Keeping the traffic within this corridor is the first step toward building an organized line where aircraft follow one another in neatly spaced lines. The controller uses speed control to maintain in-trail spacing between aircraft and altitude control to step the aircraft down while still allowing room for the aircraft to maneuver to intercept the final approach course. These individual lines from each approach fix are then interwoven so that by the time the aircraft reach the outer marker for each runway in use they are single file in the proverbial 'string of pearls' to be turned over to the Tower controller for landing clearances.



VATSIM CONTROLLER DANIEL ESPONDA'S ASRC SCREEN, SHOWING THE DEPARTURE CONTROL POSITION IN OPERATION AT DENVER INTERNATIONAL.

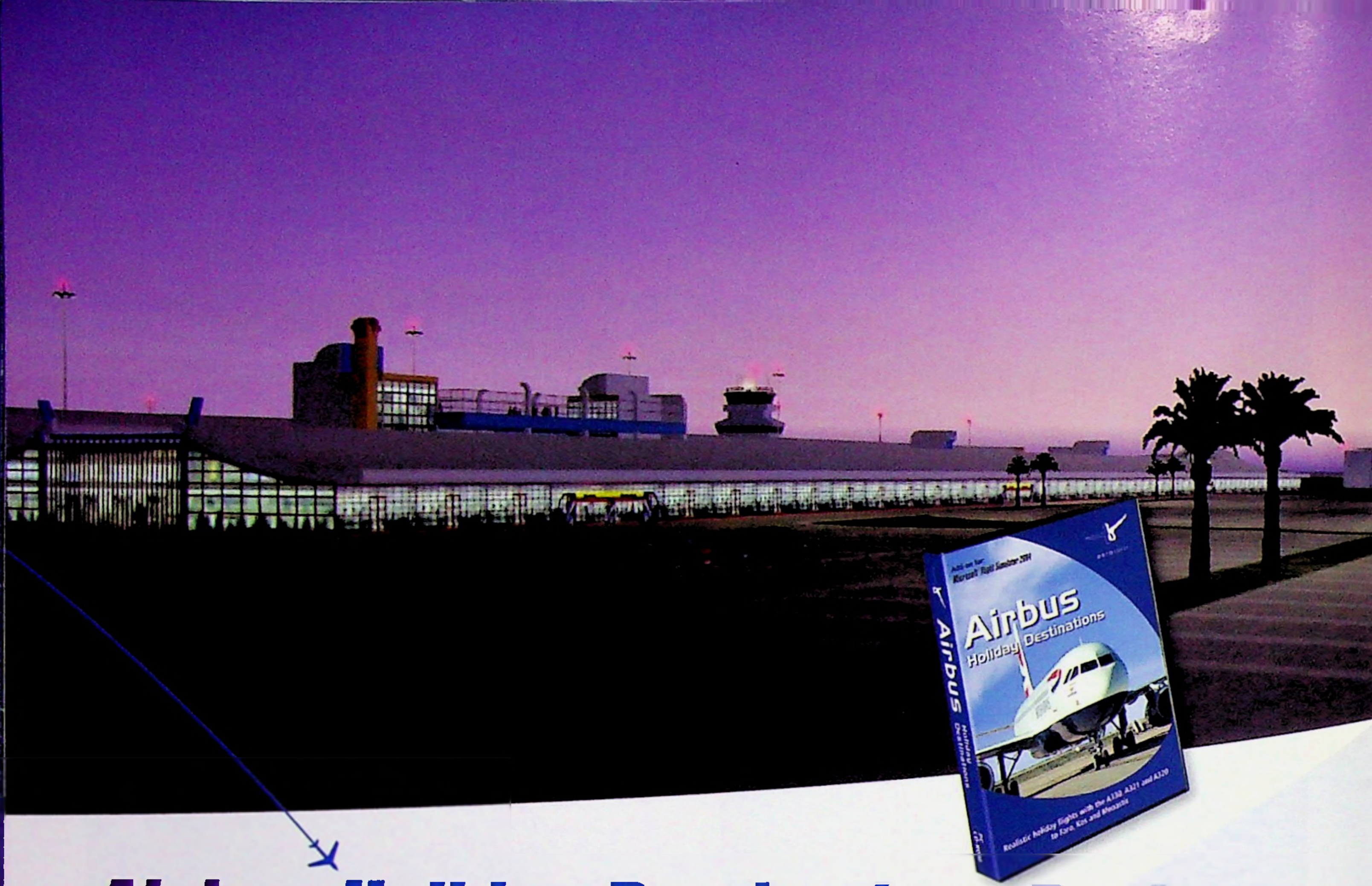
While this is going on, departing traffic is emerging on the opposite side of the runway area and is shepherded to the designated departure fixes. These points are arranged so as to keep departures out of the approach corridors until they have climbed above the arriving traffic. As these flights proceed on their departure routes they are in turn handed off to the Center controller.

The Center controller position combines all of the skills learned to master the other positions and utilizes them as necessary to provide control service across the entire range of control responsibility. This controller is responsible for the traffic that has either departed from or is arriving to an airport within the ARTCC and enroute traffic that is passing through the area. In addition, the Center controller provides a full range of services from clearance delivery to takeoff/landing instructions and departure/approach instructions for traffic utilizing airports not under the control of an Approach, Tower, Ground or Clearance Delivery controller. Therefore, the Center controller must be a 'jack of all trades' well versed on the procedures for many airports in the ARTCC and experienced at handling traffic in any phase of flight.

The pride of accomplishment felt by a controller at the conclusion of a long session of successfully working heavy traffic is akin to that of a pilot hand flying a 767 who breaks out of fog at minimums, sees the runway lights directly ahead and guides the airplane to a smooth landing in gusty crosswinds. Both roles demand a commitment for the pursuit of excellence and provide a great reward to the practioner.

Controlling may not be for every simmer but those who take to it find the knowledge they gain to be indispensable and eagerly look forward to every session "in front of the scope". ✈

WHETHER IT IS REAL WORLD ATC OR SIMULATED ATC, PILOTS RESPECT THE SERVICE ATC OFFER TO KEEP THEM SAFE IN THE SKIES AND ON THE GROUND.


Airbus
Holiday Destinations
Realistic holiday flights with the A330, A321 and A320 to Faro, Kos and Monastir

Airbus Holiday Destinations Review

BY GENE DAVIS

Once again I find myself at my desktop computer wishing I could be somewhere else, some holiday destination with a beautiful coastline and warm weather. Well, this time around we will take a look at *Airbus Holiday Destinations* ***from Aerosoft, and with this add-on you will be literally transported to these beautiful places at a fraction of what it would cost to actually go there.***

This add-on is really quite impressive. Not only does it come with some really nice scenery, you will find that the airports have all been modeled after their real world counterparts, and if that wasn't enough, you will find a fleet of new Airbus aircraft in your hangar complete with custom sounds, virtual and 2D cockpits, and nicely modeled exteriors.

"Ticket Please!"

Airbus Holiday Destinations ships in a DVD-style box and is packaged with a 59-page manual that covers everything from the Airbus to the included airports and the recommended scenery settings for this product. I also like that Aerosoft chose to include printed charts for each airport that is in this add-on. There is nothing worse than flying into an area that you are unfamiliar with and can't find the appropriate charts. The entire package requires about 350 megabytes of hard drive space and that includes the aircraft as well; frankly I was a little surprised that it was only 350 after seeing what you get in this package.

The Scenery

The scenery that comes with Holidays is very good and the areas that you will find are upgraded include Faro (Portugal), KOS (Greece), and Monastir (Tunisia). Not only are the airports completely redone, but the surrounding areas have been nicely detailed and make for some quality VFR flying over your favorite vacation spots. The cities have all been reworked with custom landclass and scenery textures so you will see homes and businesses where they should be, and if that wasn't enough, the road system in those areas have also been enhanced to give you a decent rendition of each city that is covered in the add-on.

In and around these particular areas you will be greeted by an assortment of dynamic scenery. You will see cruise ships, sailboats, and other types of marine traffic. Now, I know this is nothing new, but it really adds to the excitement of this package and kind of gives you a feeling of "being there".

I especially enjoyed flying over Monastir and Faro. I loved the wide open beaches of Monastir, though they probably look a little more crowded in real life, and it would have been nice to have seen some life on those beaches in MSFS. KOS, Greece was also an interesting place to explore. All of the surrounding islands are enhanced and add to the flavor of island-hopping flights.

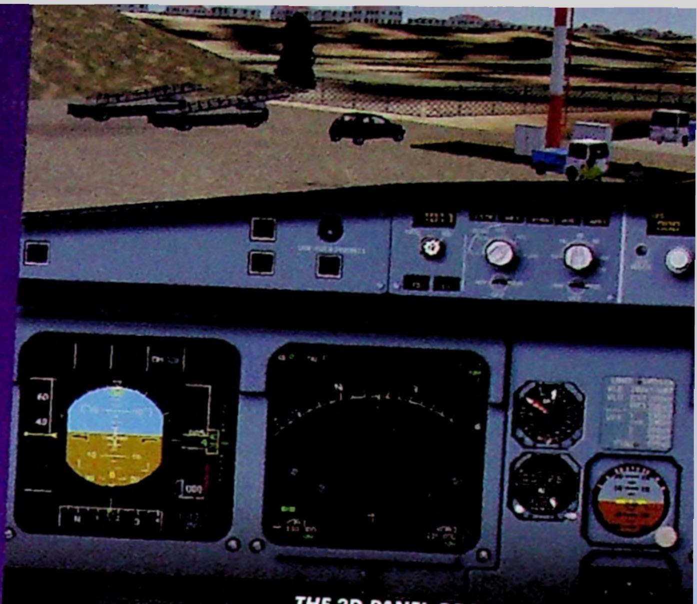
One thing I am going to recommend with this particular add-on is that you grab a terrain mesh enhancement like *FS Global 2005* by Pilots. This will add to the surrounding terrain and give you a good idea of what the areas are actually like in the real world.

The Airports

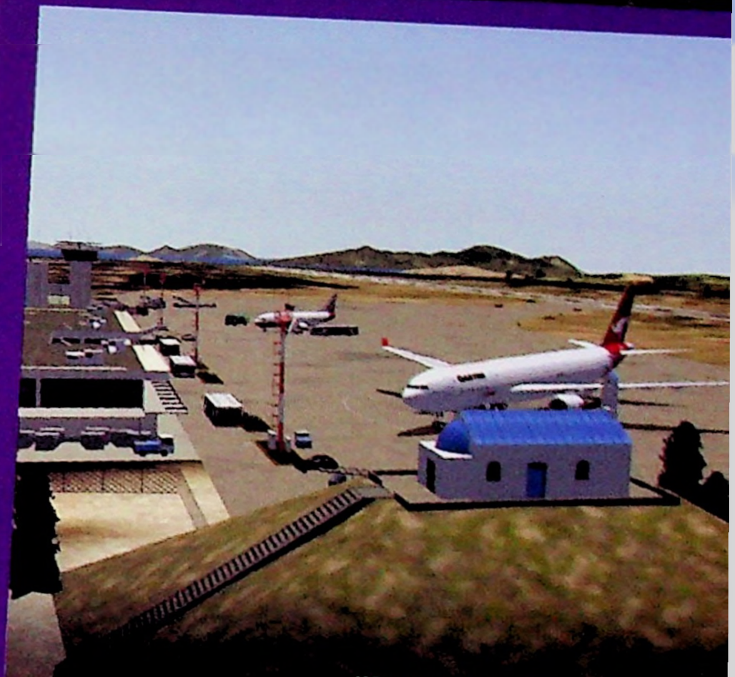
The airports alone make this package worth its weight in gold as they have a wide array of static vehicles, people and many custom buildings that look like their real world counterparts. What you have to understand here is that each airport has been totally re-done and has eliminated all of the default buildings at and around the airport, as well as included vehicle parking areas and passenger loading zones. At one of the airports I was looking over, it had a passenger lounge on the roof of the terminal building and guess what? It had people in it, watching the airplanes! You will also find that when you are taxiing into a gate you will be guided in by ground crew, again this is nothing new, but it certainly adds to the realism. Another nice feature is the inclusion of dynamic vehicles that roam around the airport; this really adds to the experience when you are taxiing into a parking area as it literally brings the whole airport to life. You will also find the runways, taxiways and airport parking areas have been completely reworked and offer the same level of quality as some of the other airport add-ons that are available for MSFS.

Each airport is VFR and IFR flyable, so if you find that your weather has gone south on landing, you can make the necessary changes to your instruments and fly it in the "hard" way.

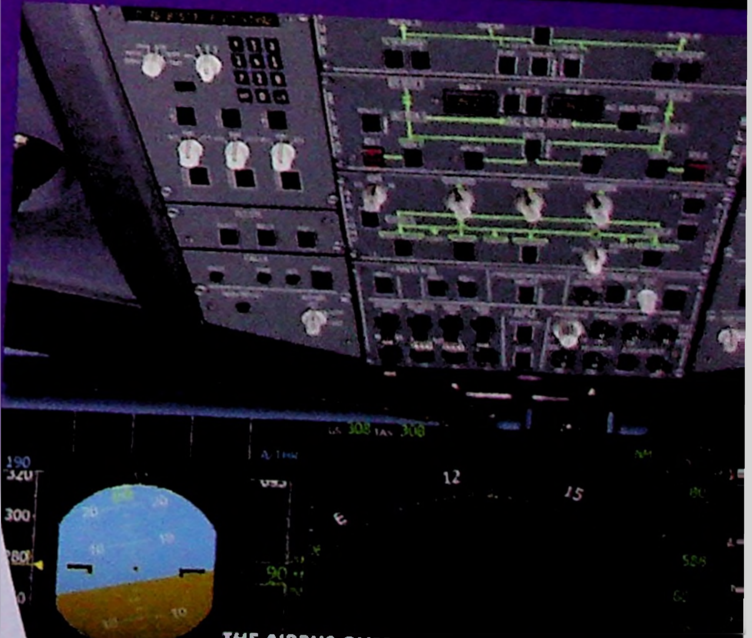
Making these airports work for you will take some adjusting in your settings menu in MSFS as they are very detailed, and can affect frame rates. This is somewhat dependant on the speed of your computer and video card but, on the plus side, the "printed manual" goes into detail on what you should change so you won't be flying at slideshow speeds.



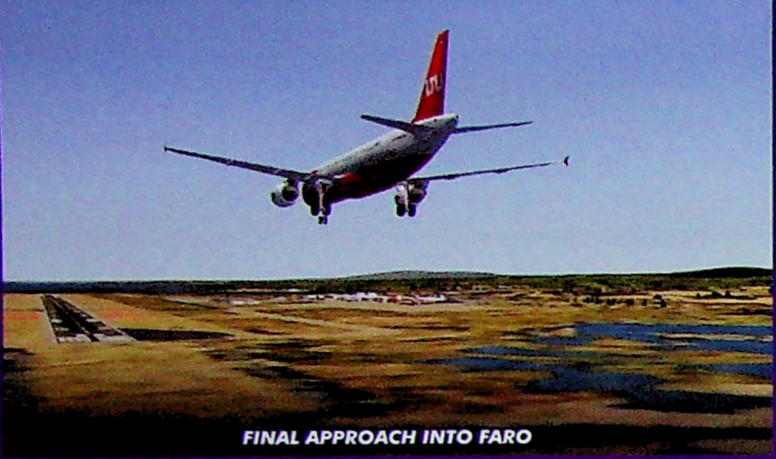
THE 2D PANEL OF THE AIRBUS AIRCRAFT



KOS, GREECE AIRPORT DETAIL

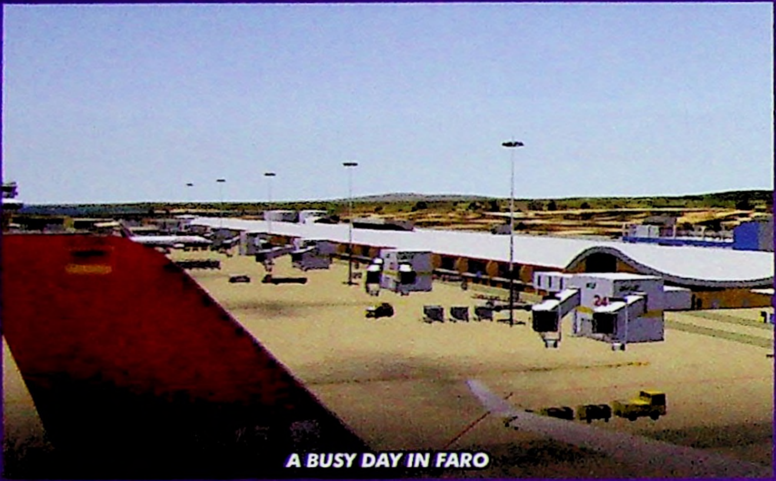


THE AIRBUS OVERHEAD PANEL AND ENLARGED MFD

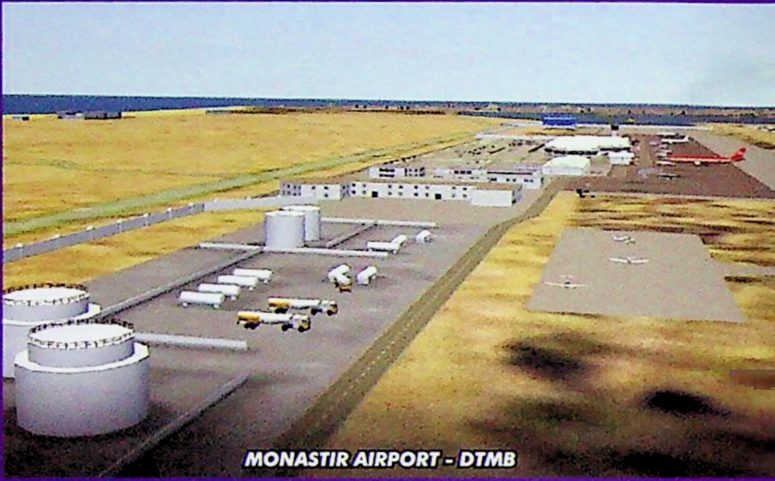


FINAL APPROACH INTO FARO

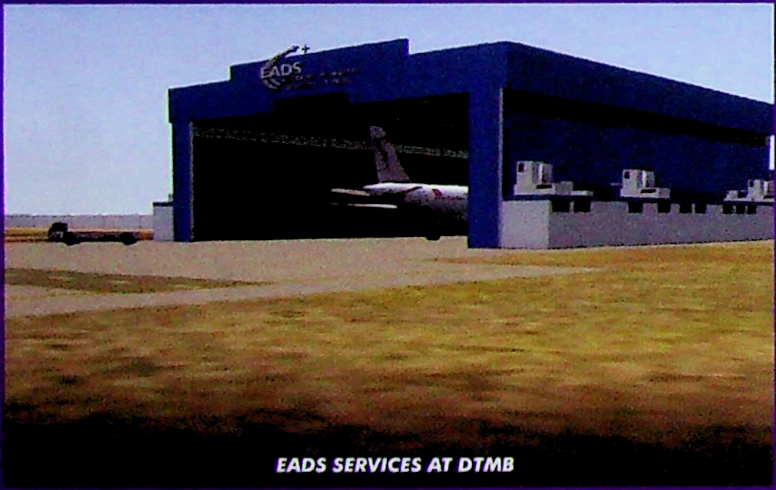
DUSK FLIGHT OVER MONASTIR



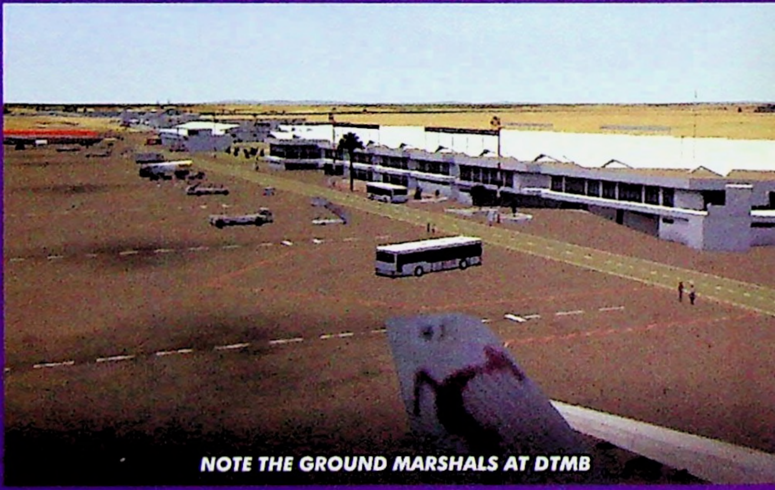
A BUSY DAY IN FARO



MONASTIR AIRPORT - DTMB



EADS SERVICES AT DTMB



NOTE THE GROUND MARSHALS AT DTMB

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SCENIC FLIGHT OVER FARO

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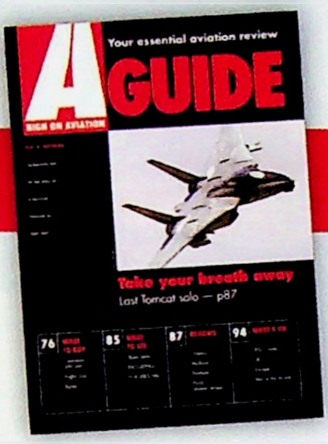

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The Aircraft

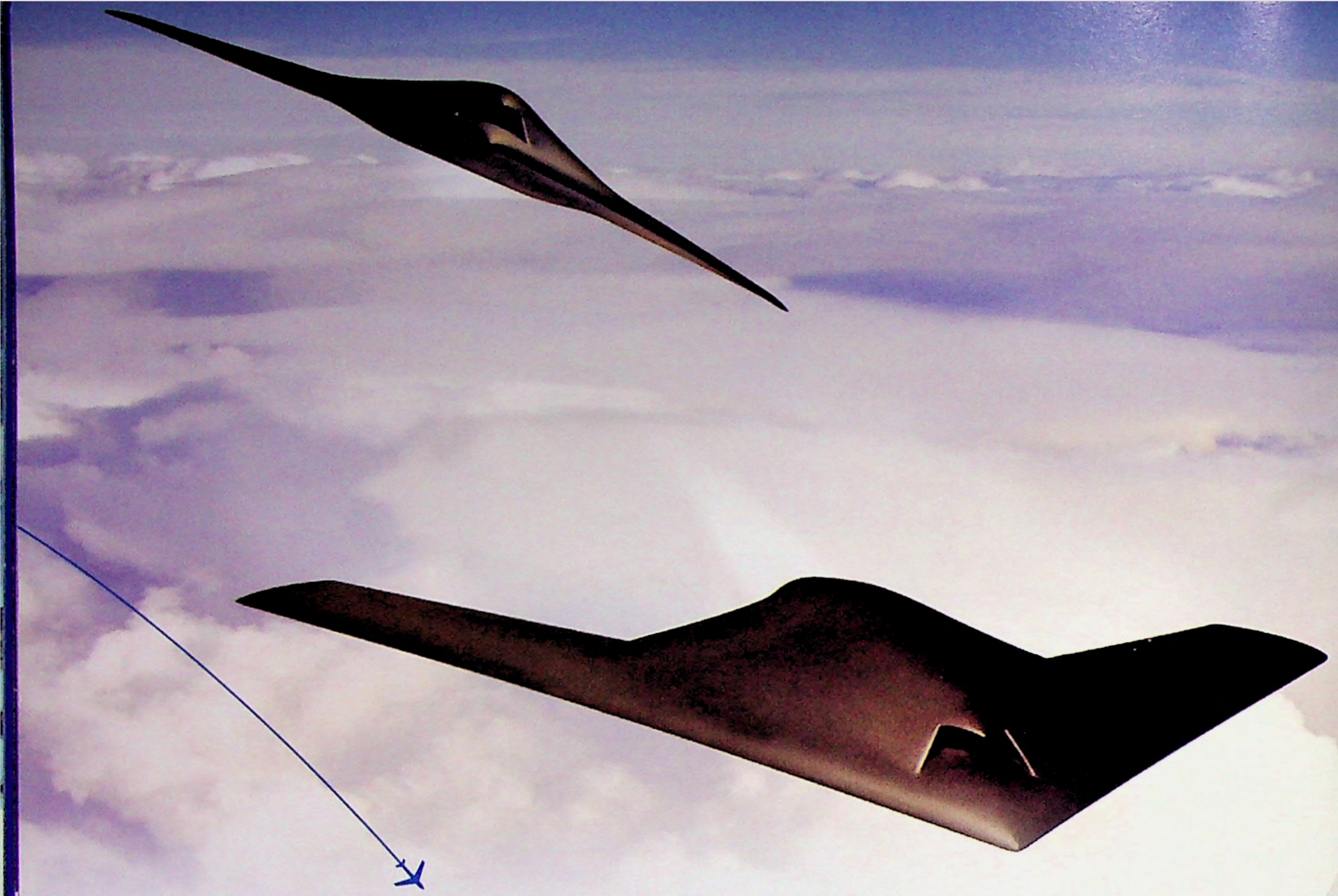
The Airbus that is included in this add-on comes in 3 different models, the A319, A321 and the A330 and a total of 52 different liveries between the three of them. The exteriors of each aircraft are nicely done, and they do include a great deal of detail, including a lot of moving parts. The one great thing about the planes is that they are very frame rate friendly - my entire flight remained very fluid from takeoff to landing. These are the same aircraft that are available through Aerosoft's "Download Shop" and they retail at around $20.00 each depending on what package you buy, so this is a pretty good deal when you consider you are getting the planes, the scenery, and the airports all in one package.

The complexity of each Airbus is a little on the simpler side; the FMC and autopilot systems are not as complex as those from the PSS package, but I found that I do like the simplicity of the aircraft and enjoy the fact that the MSFS flight plans are loadable into the Airbus FMC, thus making it much easier to program the flight computer. The 2D panel is pretty good. In fact, I prefer the 2D over the virtual cockpit in this package just because it looks better and has a good feel to it. The virtual cockpit is a little on the boring side - it is a relatively basic looking VC without all the bells and whistles that you would get with other aircraft of this type. However, for viewing purposes the VC works well, and the aircraft as a whole runs satisfactorily on lower-end systems.

The sound is also enhanced; each model has different sound depending on the type of engine. I liked the fact that they used a totally different sound set for the A330, instead of just using the A321 sound. The sound for the A330 has a very solid feel to it and gives you the impression that you are in a larger aircraft. The internal sounds of the cockpit are also relatively good, giving the pilot the traditional GPWS, and along with that there is a good array of voice call-outs from your virtual co-pilot. The warning system aboard the airbus has also been simulated, and in many ways makes this plane a good contender in comparison to other Airbus products.

In the End...

This is a nice addition to FS2004, and if you enjoy flying in and around these particular areas this add-on will be just right for you. Now, if you have been curious about the Airbus and have never looked at one before and want something on the simpler side, get this package as it makes for a great introductory flight to the Airbus aircraft. Retailing at around US$40, you might think it's kind of pricey, but in reality you are getting two aircraft packages, three scenery enhanced regions and three brand new airports all in one, so the price tag isn't that bad in my opinion. Aerosoft's *Airbus Holiday Destinations* is available from all good flight sim retailers.



The 46th Paris Air Show - 2005

BY PHIL PASCHUTINE

With 1,905 exhibitors, 46 countries represented and 154 delegations from 66 countries, the 46th Paris Air Show (PAS) proved that aviation is doing very well indeed.

Unlike the previous Paris Air Shows, there were only 4 trade days instead of 5 and 3 public days instead of the usual 2 so visitors were in for a treat. The last PAS had over 138,000 visitors so an extra day was welcomed. Unfortunately, many of the interesting aircraft open to trade visitors and the media were "closed" during public days.

To the Press, trade days sure felt like public days with all the activity going on... We had never seen so many delegations taking turns to visit aircraft since we first started attending in 1999. Taking photographs was quite a feat as there was always ***someone*** in front of the camera... I always complain!

There was a notable increase in exhibitors in the European aircraft and equipment manufacturers as well as small and medium enterprises. A noted increase in the participation of Canada, Germany, Israel, Korea, Turkey, United States and major players of the American and Russian aerospace industry was observed. Six new countries joined the ranks: Eire, Morocco, Pakistan, Qatar, Saudi Arabia and the Slovak Republic.

Recreational aviation had its own show with 40 exhibitors and as many aircraft, such as ultralights, gliders, autogyros and airships. Several workshops demonstrated aircraft covering, rib making, autogyro flight simulators and several other workshops covering basic flight and piloting and building techniques. I do hope that recreational aviation will continue to expand at the PAS.

The USA had 22 aircraft of which 5 took part in aerial demonstration: C17, F/A-18E/F, F16C, KC130J and the T-6A. Because US military and manufacturers came in greater numbers, business was conducted at a military pace, no longing over breakfast, just business and on to the next customer.

As Press you had to prove you actually had an appointment with a representative to get in the chalet and act as a freeloader like the rest of the gang. After breakfast meetings, you had better not stay in the press room! While we did manage to get in the very first day and see the great in-flight demos from the best spot in the airport and eat fine foods, we couldn't get past the hosts the following days. Yes sir, this was a bad year for the press but definitely a good year for everyone else. They were so busy with prospective customers that our onboard time was limited to a few shots and "would you please de-plane as fast as you can because an important delegation is coming in right after you". We wanted to take cabin photos of the Embraer 195 and of Dassault's Falcon 7X. Somehow there was always a delegation visiting it. So we missed a couple of aircraft we'd like to have shown you. Boeing and Bombardier, ATR plus other companies allowed Press onboard their aircraft. Airbus on the other hand shut all theirs tight so no one got a chance to board any of them.

Apart from the Eurocopter, Airbus A340-600, Mirage, Rafale, EF Typhoon, Mig29 and Sukhoi 27 which are a part of just about every Paris Air Show, there were several newcomers this year:

Country	COMPANY	AIRCRAFT	NEW	FLIGHT
Germany	GROB AEROSPACE	G115EG		
		G180	N	
Intl Coop	AIRBUS INDUSTRIE	A380-800	N	X
USA		B767-300 TANKER	N	
		B777-240 LR	N	
	GULFSTREAM	G450	N	
		G550	N	
France	DASSAULT AVIATION	FALCON 7X	N	X
	JCR TECHNOLOGY	JCR001a (flapping wings)	N	
	REIMS AVIATION	GAVILAN 358	N	
	SOFEMA	ZEPPELIN	N	X
Italy	ALENIA	M311	N	
		M346	N	
Russia	KAZAN HELICOPTER	MI38	N	X
Slovakia	AVICAR INT.	AVICAR 204	N	
		AVICAR524VT	N	
Switzerland	PILATUS	PC12	N	

The super Constellation was quite a sight. In any case, all agree that the real star of the show was the A380.

Airbus A380

Many of us wondered how the A380 could actually land at the Bourget. We believed then that, due to its massive shape and generous width, the taxiways would not be able to handle such a big aircraft and we were relieved when we learned of its presence and saw it take off and land on its daily in-flight demonstrations.

We really didn't know how big it would actually be? Watching the A380 on television, we thought of it as a huge whale that was "about this wide and about this long and about this high" but couldn't figure out its dimensions.

I had expected it to be longer than a 747 and was surprised to see it was only 2m longer than a 747-400 ER and looked a tad 'short'. Other parts such as wingspan and wing area alone are mind-boggling!

With a total of 154 orders including A380 freighters, the A380 seems to be a fine alternative to the aging 747s in both passenger and freight transport. In the meantime Boeing is looking to offer a 450 seater as of 2009.

The A380 is indeed a gigantic European puzzle. The main parts come from Europe but half of the parts used in building the aircraft come from the USA, Japan and Canada.

There are 16 building/assembly sites and 157 enterprises located in some 20 countries. The final assembly is performed in the hall Jean-Luc Lagardère at Toulouse Blagnac's airport. Assembly rate is 4 aircraft a month but it could be raised to 8.

Parts	Location
Aft fuselage	Hamburg (Germany)
Ailerons	Nantes (France)
Elevators	Spain
Engine pods	St Eloi (France)
Flaps	Bremen (Germany)
Forward fuselage	Hamburg (Germany)
Horizontal stabilizer	Cadiz-Getafe (Spain)
Mid fuselage section	St-Nazaire/Nantes (France)
Fuselage cone	St-Nazaire/Méaulte (France)
Tail end cone section	Getafe (Spain)
Vertical stabilizer	Stade (Germany)
Wings	Broughton (UK)

What changes will be needed to make an airport A380 friendly?

There shall be very little changes needed to make an airport "A380 friendly": additional air bridges, adapted departure lounges, wider taxiways and adapted air buses.

Leaving a big aircraft like the 747 can be quite an experience for 416 pax. You move forward a few feet, wait a few seconds, move forward a few feet etc... The A380 will be no exception and 555 people wanting to board or leave the aircraft in as short a time as possible will give airlines something to reflect on. They need to find a solution ensuring a smooth continuous flow of passengers and have a total turnaround time of 90 minutes, as is currently the case with the 747.

No one was allowed a peek inside the A380 and no one will for some time to come - at least not until airlines reveal their interior designs. This is one area of total secrecy. Based on what we have seen in the mockup of the A380, there will be plenty of leg room and spacious seats, communal spaces such as bars, library, meeting areas, workstations, bistros, duty free shops, gymnasiums or whatever else airlines want but these can only accommodate a few people at a time. In the mockup, the bar was crowded with 6-7 people, imagine 549 people waiting in line to buy a drink!

The cockpit is a further development of the A320 and A330/A340 families and uses the same operating procedures. Many pilots qualified on fly-by-wire Airbuses will be familiarized with this flight deck. This cockpit will have eight identical interactive displays with cursor control provided by a track ball. The screens will be larger and have clearer presentations. It also has extended integrated modular avionics linked by ethernet datalink. The HUD will increase pilot situational awareness during the critical phases of the flight. The cockpit position is located halfway between the main and upper deck so the view remains similar to other Airbus aircraft.

OVERHEAD CREW REST QUARTERS – COPYRIGHT BOEING

777 LR – COPYRIGHT BOEING

777 WHEELS

A380 MAIN DECK PREMIUM ECONOMY – PHOTO EADS

PORT WINGVIEW

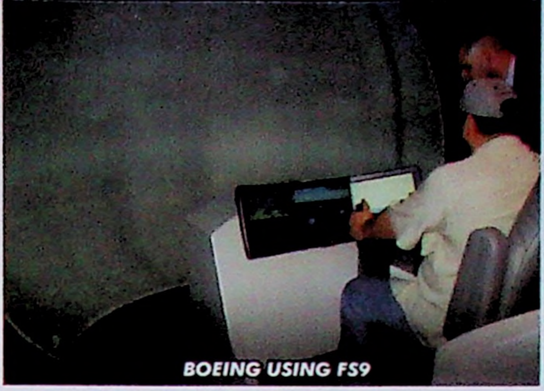
777 LR

A380 COCKPIT - PHOTO EADS

A380 AIRBORNE

FALCON 7X

FLEXO F6 CABLE ORGANIZERS



BOEING USING FS9

MILITARY SIMULATOR WITH MULTI-ANGLE VIEW

CHASING A BANDIT!

THE SU-27

UAV

GALILEO - PHOTO EADS

SANTOS DUMONT'S AIRCRAFT

THE "CONNIE"

Two flight simulators will be based at the Airbus training Center in Toulouse.

"The simulators, manufactured by Canadian aviation simulation and training company CAE, feature an exact replica of the A380's cockpit and incorporate the actual A380 flight control systems and on-board computers."

To make flying in the machine even more realistic, the resolution of simulated flight graphics has been increased by some 40 percent, geographical features are shown in greater detail and the sphere of vision surrounding the pilot has also been increased to 200 degrees from the more usual 180 degrees.

"Airbus' flight analysis system AirFASE has been integrated into the simulator. This system records the in-flight data generated – from how the flight controls are handled to engine performance – and produces a detailed report on how the flight has been managed. This is then picked up by Airbus flight instructors, who use the information to monitor and understand each trainee's progress."

With something as big as this, you'd expect some noise on takeoff. Well unless you were looking at the A380 during takeoff, you wouldn't know it was taking off.

While on its very first flight in Toulouse, spectators were amazed at how little noise the A380 made. The Belugas taking off were much noisier.

Boeing's 777-200LR Worldliner

Two years ago we presented you the 777-300 ER. The new 777-200 LR (Long Range) is significantly more fuel efficient than its competitor, cleaner than the A340, has a smaller noise footprint than the A340, and is quieter than current and proposed noise standards. Sounds like a dream aircraft right?

This aircraft made its first flight on March 8 2005 and can fly 301 passengers over 9,420 nm. Cruise altitude will be 35,000 ft at mach 0.84. First deliveries are due first quarter of 2006.

There are 2 crew rest compartments, one located right outside the cockpit and one at the end of the aircraft above economy class providing 6-7 sleeping births for the attendants and 2 for the relief pilots.

Technical Specifications	
Passengers 3 class	301
Cargo (m^2)	150 including up to 6 pallets and a 14-LD3 containers plus 17 m^2 bulk cargo
Engines /Max thrust (kN)	GE GE90-110B1/489
Max fuel capacity (l)	202,287 – includes 3 optional tanks.
MTOW (kg)	347,452
Max range (nm)	9,420 Houston-Karachi NY-Singapore Perth-London NY-Auckland Chicago-Sidney Miami-Taipei
Cruise speed @ 35 000 ft	0.84 M
Wingspan (m)	64.8
Overall length (m)	63.7
Tail height (m)	18.8
Interior cabin width (m)	5.86
Diameter (m)	6.19

UAVs (Unmanned Aerial Vehicles)

The UAVs are either ground controlled or pre-programmed. They come in all flavors, shapes, and sizes from a miniature aircraft (a 500g micro-drone) to an inflatable wing or helo, to a UFO, and to some as big as an Airbus! They can land on the ground or on a ship or water. During tactical ops they proved to be quite elaborate stealth planes in recon, strike, and surveillance missions during the Iraq conflict.

Apart from their military applications there are no limits to what UAVs can perform: fire watch, pollution tracking, immigration monitoring, coastguard border and fisheries protections, and should be able to find mines or water sources in the not too distant future. Based on their mission, they can embark specific electronics such as acoustic or sound captors, thermal cameras, and sensitive detectors.

During the airshow the French unveiled Europe's demonstrator for the next generation of combat aircraft. The NEURON is an UCAV (Unmanned Combat Aerial Vehicle) with a width of 8 meters. This UCAV could be used in ground attacks with air to ground weapon delivery from an internal bay with stringent tempo constraint. It is 'stealthy' thanks to specific material preventing radar detection (radar cross section and infra red).

Galileo

Galileo is the European satellite navigation system. By the end of this decade, Galileo proposes "*Accurate determination of position at any time and anywhere, secure and reliable navigation, and efficient route planning*".

The difference with the American GPS is that Galileo will be an all-civilian system made to civilian user's requirements. No less than 30 satellites monitored and controlled from one of two centers based in Europe will orbit the earth at an altitude of 23.333 km.

Galileo will provide 4 different services: Open Service (OS) for navigation systems in vehicles; Safety-of-Life Service (SoL) for rail and air traffic control; Commercial Service (CS) with greater accuracy in position determination; and Public Regulated Service (PRS) for "*national government applications*" who require an interference-proof signal.

Additionally, a SAR service will receive and relay the distress signals. The list of the benefits to our daily life is quite impressive. You'll be able to use your mobile phone and be given details of restaurants or hotels near you or send out a distress signal, and these are just a small sample of the possibilities.

Simulators

Big companies like Boeing used FS2004 to show their aircraft; Russian helicopter companies used X-Plane to teach their pilots. Other groups and SME's demonstrated their flight instruments with FS2004 or X-Plane. These two programs have become the cheap alternative to expensive in-house software and, based on my experience of professional flight simulators (A340), nothing beats the FS or X-Plane environment, and at a fraction of the cost!

The only exception was the French Air Force and the more expensive Dassault simulators for the Mirage and the Mako. Sadly enough, BAE didn't bring their Hawk sim this year.

The French Air Force SRV3 is an external world display creating immersion with only 3 windows. The field of view is rather large and has high contrast. There is no geometrical distortion and it is compatible with helmet-mounted devices. The theoretical eye location is adjusted to the application.

I also found something that may be of interest to all of you who own several computers linked together, running several screens and the odd external peripheral (thanks to extensive use of USB daisy chains) and many power cords required to have all them peripherals running! It's found at **cableorganizer.com** (**cableorganizer.fr** in Europe) and is called Flexo F6. Cost is about $1.50 per foot. It is a flexible, semi-rigid, wrappable split-braided tube with a 25% edge overlap allowing coverage around many cords or connectors. Nominal sizes range from 1/8" to 2". Alternatively you can use the Flexo wrap with hook and loop closure for frequent access. Nominal sizes are ½" to 2". This would be ideal in your simulator as it is able to withstand wide temperature variations, which I doubt you'll ever experience (-75°C to +125°C).

If you are looking for a more rigid connection, you can use split wire loom made of plastic corrugated split tubing. It even has T-connectors. Sizes are 1" and 10' long

Overall the price is not that expensive: $1.50/ft for the F6, $5.99 for the split loom and $0.30 for T-connectors.

Need I stress that a neat environment under your desk will keep your spouse happy…

Concorde

Those of us who saw Concorde's last landing in 2003 felt sorry that this magnificent bird ended its career because of fuel efficiency and engine noise issues. Rejoice! Like the Phoenix the Concorde may very well rise from its ashes. A franco-japanese team have signed an agreement on a research project of a super Concorde (200 to 300 seats) that could fly from Tokyo to Europe in 6 hours and Tokyo to New York in 6.5 hours. Time will tell…

In conclusion

Two years ago, I wrote that the 45th Paris Air Show was not as exciting as the 44th. With Franco-US relations back to normal, this year's trade days were the busiest I've seen since 1999. The display of the A380 and its flight demonstrations were simply superb and I doubt anything can beat this for some time to come.

In January 11 1962, the French unveiled the luxury liner "France" and I believe they, and the rest of the European partners, have done it again with the A380. Time will tell if this will be just an "Air Bus" dedicated to mass transportation or a luxury airliner transporting passengers to their destination in a high class environment.

Photo credits: Isabelle Bossy, Caroline Foucher, Jean-Claude Gicquel, Thierry Haddad, Jean-Pierre Martinho, Nadir Petitprêtre, EADS, BOEING, Boeing photo, Dassault Aviation / Infographie

We Fly The World

AIRBUS A380
Although it's not scheduled to enter into service until 2006, you can fly the fabulous A380 today. The Airbus A380 features liveries of these airlines: Singapore Airlines, Lufthansa, Qantas, KLM, Air France, Virgin Atlantic, British Airways and others. You'll also get a full 3D virtual cockpit and customized Flight Management Computer (FMC) that works with the Flight Simulator's built-in Flight Planner. You can fly virtually hands-free except for take-off and landing. We've also included enhanced scenery of the Toulouse (France) Airport - home of the Airbus A380 and a series of flights for you to fly. ISBN 1-55755-595-8 $19.95

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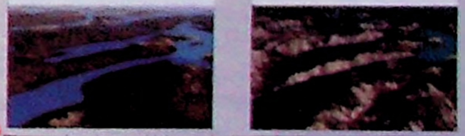
Flying is a great way to see the world's scenery and World Extreme Landscapes transforms that scenery into even more significant visual spectacles. Its three DVDs contain high resolution data to deliver an extreme level of scenic accuracy that you must see to believe. We also include tours for your "flightseeing" pleasure. ISBN: 1-55755-604-0, $29.95



The peninsulas and islands in the default southern Chile (left) are more treacherous in World Extreme Landscapes (right).

USA Extreme Landscapes
The beauty of Microsoft Flight Simulator is the boundless geographic places you can visit. Drop in USA Extreme Landscapes and we'll transform these magnificent places into even more visual spectacles. This new adventure package delivers a new level of scenic accuracy that you'll have to see to believe. We've replaced the default elevation data with higher resolution 38 and 76 meter info which increases the detail 32-fold. The detail is 'so real – it's unreal! For your "flightseeing" pleasure fly the pre-planned tours in the Piper Dakota from Carenado. You'll be able to fly "low and slow" and have a chance to see the new landscape up-close. ISBN: 1-55755-546-X, $29.95

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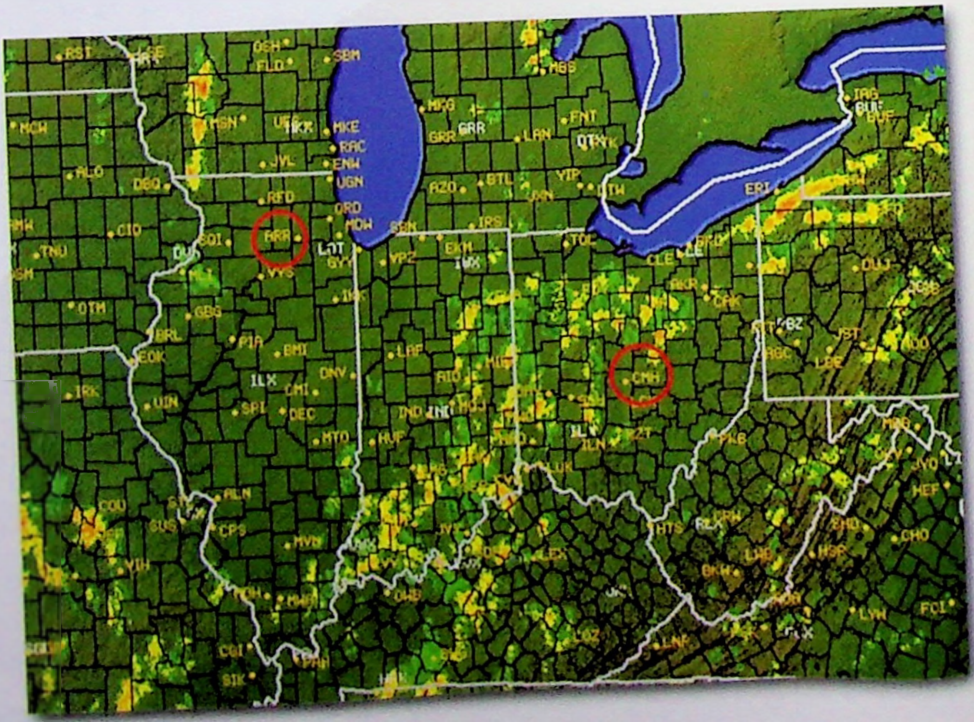
Training for an Instrument Rating
PART I

BY DOUG HORTON

After several surprising and extremely humbling weather occurrences on my first few flying excursions after completing Private Pilot certification, it became very clear that you can't "wish the weather" you want. Suppose, for example, you plan to return to Chicago Aurora (KARR) from the Ohio State airport (KOSU) near Columbus, Ohio (KCMH), as I did the week before preparing this article. With my membership in the Aircraft Owners and Pilots Association - www.aopa.org - I retrieved the current radar graphic for weather in the Midwestern U.S. Ready to fly? Perhaps not. At least for a few hours anyway, due to the line of rain and thunderstorms between Columbus and Chicago.



AOPA RADAR GRAPHIC SHOWING WEATHER CONDITIONS IN THE MIDWESTERN U.S. ON A SUMMER AFTERNOON

In the preface of *Instrument Flight Training Manual* by Peter Dogan, the author relates a true story about two couples who intended to fly their respective general aviation aircraft from New Jersey to Florida for a shared vacation. The instrument rated pilot and his passenger completed the flight in one long day of flying. The other pilot and passenger, without an instrument rating, arrived *one week later*, after dodging rainy weather and renting hotel rooms for several extra nights in cities not on the original itinerary.

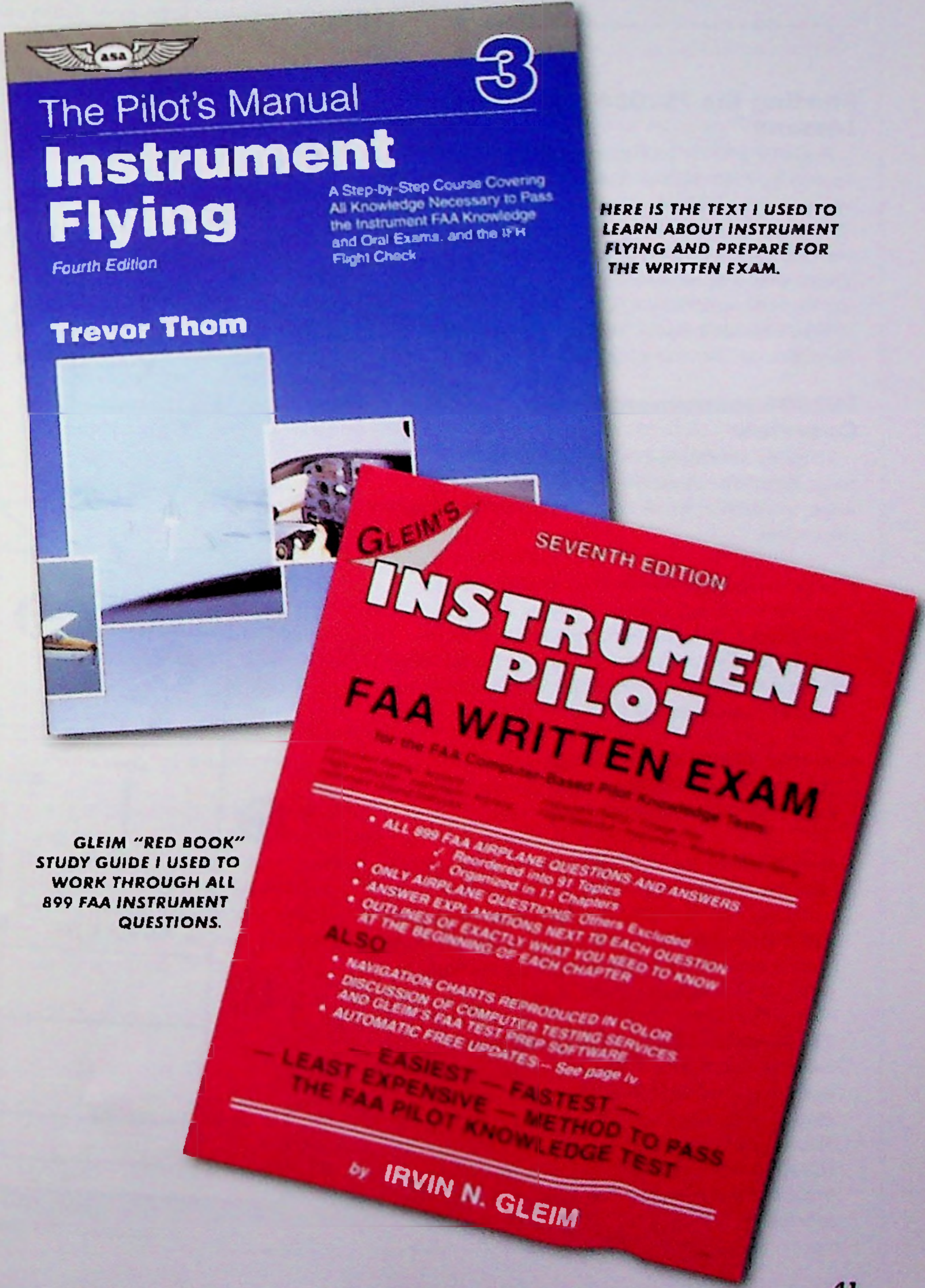
After experiencing how variable aviation weather can be, I began instrument training immediately after private pilot certification. I hoped that I'd learned a lot about instrument flying and air traffic control from 10 years of computer flight simulator flying. With older versions of Microsoft Flight Simulator, I'd flown many flights under ATC with Flight Shop and the ProFlight series, as well as flying online with SATCO (now VATSIM). I'd also flown under simulated ATC with Fly! and two versions of Flight Unlimited. And I'd listened for several years to real ATC dialog on United Airlines flights, as the pilots usually make it available on the entertainment system. Yes, I'd learned many of the fundamentals of instrument flying from my simulator flights, but there was still a great deal to learn.

Studying for the Written Exam

Throughout the five months I spent on instrument training, I studied extensively for the written exam (which the FAA calls the Knowledge Exam) using *The Pilot's Manual—Instrument Flying* by Trevor Thom. I studied for the exam as I experienced instrument lessons, though I soon wished I'd begun studying the text earlier because I practiced many of the instrument training exercises before my knowledge was complete from reading the text. Flying was certainly more interesting than reading, but toward the end of my training, my instructor indicated I was ready for the required practical test (checkride) before I completed the written exam. In contrast, my initial instructor for private pilot certification required that I pass the written test *before* I began flight lessons. The ideal is probably a compromise, but I should have paid more attention to studying the textbook and preparing for the written exam sooner.

As I mentioned during the five-part series of *Computer Pilot* articles on completing a private pilot certificate, the questions for all exams are made available by the FAA, so thorough preparation for the test includes working through all 899 questions in the instrument rating question bank. During the actual exam, which is administered by computer at most flight schools and many other facilities, 60 questions are randomly chosen to cover all topic areas. To prepare for the exam I used the familiar "red book" published by pilot and educator Dr. Irwin Gleim. This book is organized by knowledge areas and for each area there is a summary of the information covered by the questions in that section. The information summaries are followed by the FAA questions that pertain to each area. For each question, there are three multiple-choice answers, along with descriptions for each choice that explain why the choice is correct or incorrect.

The minimum passing grade for the written exam is 70 percent correct, though it seems that no one should target just passing. It's important to study and learn as much as possible, because you will likely need the knowledge for subsequent instrument flying. Also, I think that the oral part of the practical test goes better with an examiner if you've done well on the written exam.


ASA
3
The Pilot's Manual
Instrument Flying
A Step-by-Step Course Covering All Knowledge Necessary to Pass the Instrument FAA Knowledge and Oral Exams, and the IFR Flight Check
Fourth Edition
Trevor Thom
GLEIM'S
SEVENTH EDITION
INSTRUMENT PILOT
FAA WRITTEN EXAM
for the FAA Computer-Based Pilot Knowledge Tests
• ALL 899 FAA AIRPLANE QUESTIONS AND ANSWERS
✓ Reordered into 91 Topics
✓ Organized in 11 Chapters
• ONLY AIRPLANE QUESTIONS: Others Excluded
• ANSWER EXPLANATIONS NEXT TO EACH QUESTION
• OUTLINES OF EXACTLY WHAT YOU NEED TO KNOW AT THE BEGINNING OF EACH CHAPTER
ALSO
• NAVIGATION CHARTS REPRODUCED IN COLOR
• DISCUSSION OF COMPUTER TESTING SERVICES AND GLEIM'S FAA TEST PREP SOFTWARE
• AUTOMATIC FREE UPDATES -- See page iv
— EASIEST — FASTEST — LEAST EXPENSIVE — METHOD TO PASS THE FAA PILOT KNOWLEDGE TEST
by IRVIN N. GLEIM

HERE IS THE TEXT I USED TO LEARN ABOUT INSTRUMENT FLYING AND PREPARE FOR THE WRITTEN EXAM.

GLEIM "RED BOOK" STUDY GUIDE I USED TO WORK THROUGH ALL 899 FAA INSTRUMENT QUESTIONS.

FS2004 Instrument Lessons

The FS2004 instrument training lessons with Rod Machado include the following lessons and solo flights:

Task to complete	Description
Instrument Rating Lessons Overview	Start your FS2004 instrument training by reading what instrument flying is all about.
Solo Flight: Scanning the Instruments	Read about the techniques of instrument scanning, and then practice them in a flight.
Lesson 1: The VOR Approach	Learn how to use the VOR to get down to the runway at Paine Field.
Solo Flight: VOR Approach	Practice the VOR Runway 34R approach into Seattle-Tacoma International.
Lesson 2: The ILS Approach	The Instrument Landing System helps you fly to lower altitudes without visual contact with the ground, which translates into a better chance of landing in bad weather.
Solo Flight: ILS Approach	Fly the ILS Runway 16R ILS approach into Paine Field.
Lesson 3: Holding Patterns	Learn how to fly in a holding pattern over the Paine VOR.
Solo Flights: Three Ways to Enter Holding	Practice Direct, Parallel, and Teardrop entries to holding at the Paine VOR.
Instrument Rating Checkride	Show the examiner how you control the airplane in the clouds, and if you pass, you'll be awarded the Flight Simulator Instrument Rating certificate.

Starting the FS2004 Instrument Lessons

Begin the FS2004 instrument lessons by reading the overview information. You can read the lessons by opening the FS2004 startup screen, then selecting Flying Lessons and clicking on the instrument lesson overview. Alternatively, you may wish to read the lessons with your browser so you can control the font size for more readability. Click your way to **FS2004\FSWeb\Lessons\Lessons_index_mainframe.htm**. Then click on Instrument Rating Lessons Overview.

FS2004 Instrument Rating Lessons Overview

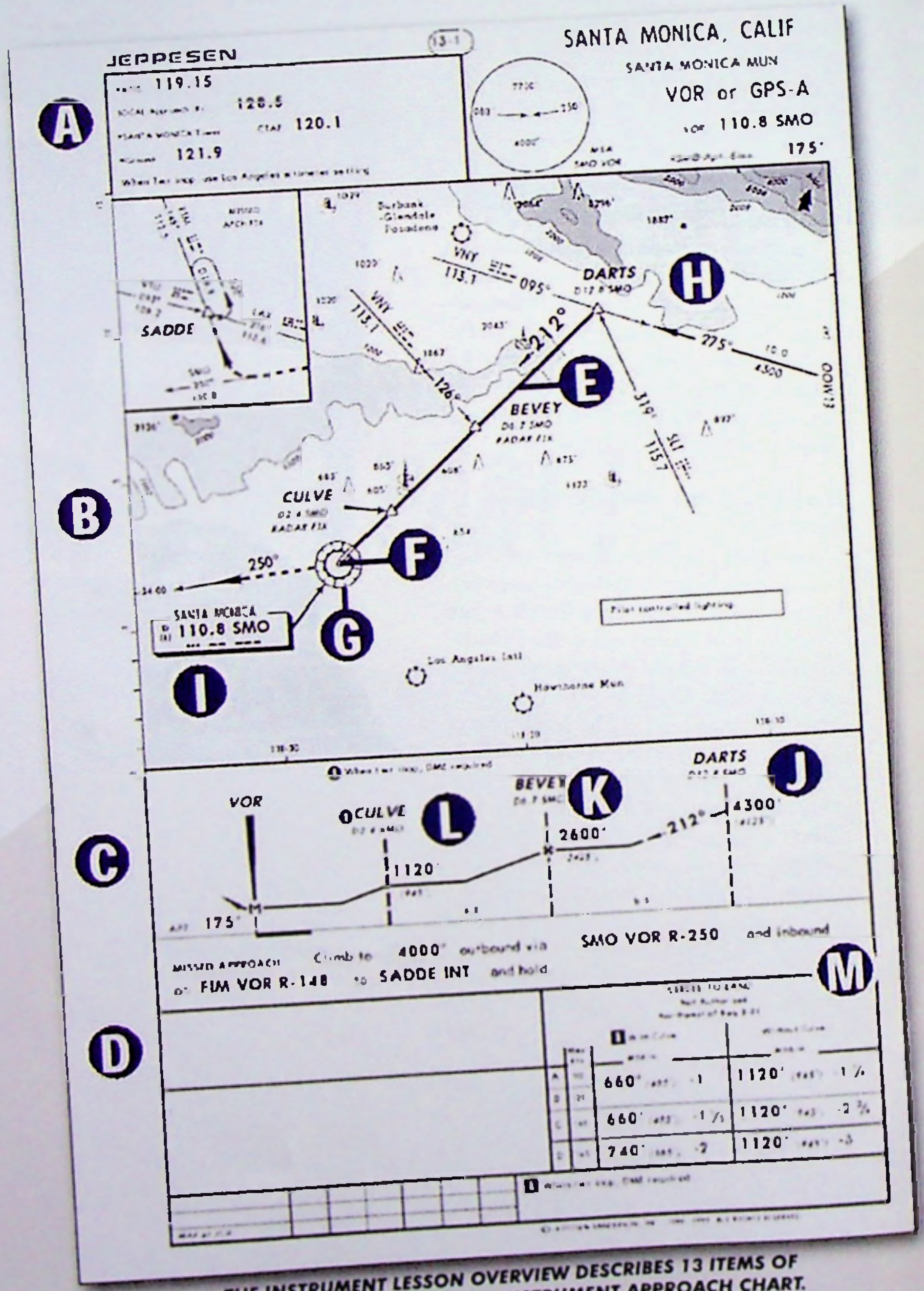
There are actually two overview reading assignments. The shorter first one has a link to the longer second one, which has the following headings and content:

- **Instrument Approaches** – this section provides the impression that instrument flying is mainly concerned with instrument approaches, when in reality, there is much more to learn, with approaches being a culmination of IFR flight, as determined by weather conditions.

- **VFR vs. IFR Flying** – the instructor briefly describes the essential differences between flying under visual and instrument flight rules.

- **Instrument Flying: The Big Picture** - this section begins with a statement that instrument flying begins with filing an IFR flight plan. Actually, it begins with planning the flight, checking weather, getting a briefing from a Flight Service Station, preparing the pilot and aircraft, and several other tasks.

- **The Approach Chart** – using the chart for the Santa Monica VOR or GPS-A approach, the lesson explains the different parts of a typical approach chart. If other users have the same experience I had before instrument training, I was only familiar with ILS approaches, and I had no knowledge of the vertical profile and other requirements for making approaches.



THE INSTRUMENT LESSON OVERVIEW DESCRIBES 13 ITEMS OF INFORMATION ON A TYPICAL INSTRUMENT APPROACH CHART.

Instrument Rating Requirements

In the United States, the requirements for an instrument rating are contained in the Federal Aviation Regulations Part 61.65:

(a) **General**. A person who applies for an instrument rating must:

(1) Hold at least a current private pilot certificate with an airplane, helicopter, or powered-lift rating appropriate to the instrument rating sought;

(2) Be able to read, speak, write, and understand the English language. If the applicant is unable to meet any of these requirements due to a medical condition, the Administrator may place such operating limitations on the applicant's pilot certificate as are necessary for the safe operation of the aircraft;

(3) Receive and log ground training from an authorized instructor or accomplish a home-study course of training on the aeronautical knowledge areas of paragraph (b) of this section that apply to the instrument rating sought;

(4) Receive a logbook or training record endorsement from an authorized instructor certifying that the person is prepared to take the required knowledge test;

(5) Receive and log training on the areas of operation of paragraph (c) of this section from an authorized instructor in an aircraft flight simulator, or flight training device that represents an airplane, helicopter or powered-lift appropriate to the instrument rating sought;

(6) Receive a logbook or training record endorsement from an authorized instructor certifying that the person is prepared to take the required practical test;

(7) Pass the required knowledge test on the aeronautical knowledge areas of paragraph (b) of this section; and

(8) Pass the required practical test on the areas of operation in paragraph (c) of this section in:

(i) An airplane, helicopter, or powered-lift appropriate to the rating sought; or

(ii) A flight simulator or a flight training device appropriate to the rating sought and approved for the specific maneuver or procedure performed. If an approved flight training device is used for the practical test, the instrument approach procedures conducted in that flight training device are limited to one precision and one non-precision approach, provided the flight training device is approved for the procedure performed.

(b) **Aeronautical knowledge**. A person who applies for an instrument rating must have received and logged ground training from an authorized instructor or accomplished a home-study course on the following aeronautical knowledge areas that apply to the instrument rating sought:

(1) Federal Aviation Regulations of this chapter that apply to flight operations under IFR;

(2) Appropriate information that applies to flight operations under IFR in the "Aeronautical Information Manual;"

(3) Air traffic control system and procedures for instrument flight operations;

(4) IFR navigation and approaches by use of navigation systems;

(5) Use of IFR en route and instrument approach procedure charts;

(6) Procurement and use of aviation weather reports and forecasts and the elements of forecasting weather trends based on that information and personal observation of weather conditions;

(7) Safe and efficient operation of aircraft under instrument flight rules and conditions;

(8) Recognition of critical weather situations and windshear avoidance;

(9) Aeronautical decision making and judgment; and

(10) Crew resource management, including crew communication and coordination.

(c) **Flight proficiency**. A person who applies for an instrument rating must receive and log training from an authorized instructor in an aircraft, or in a flight simulator or flight training device, in accordance with paragraph (e) of this section, that includes the following areas of operation:

(1) Preflight preparation;

(2) Preflight procedures;

(3) Air traffic control clearances and procedures;

(4) Flight by reference to instruments;

(5) Navigation systems;

(6) Instrument approach procedures;

(7) Emergency operations; and

(8) Postflight procedures.

(d) **Aeronautical experience**. A person who applies for an instrument rating must have logged the following:

(1) At least 50 hours of cross-country flight time as pilot in command, of which at least 10 hours must be in airplanes for an instrument-airplane rating; and

(2) A total of 40 hours of actual or simulated instrument time on the areas of operation of this section, to include:

(i) At least 15 hours of instrument flight training from an authorized instructor in the aircraft category for which the instrument rating is sought;

(ii) At least 3 hours of instrument training that is appropriate to the instrument rating sought from an authorized instructor in preparation for the practical test within the 60 days preceding the date of the test;

(iii) For an instrument airplane rating, instrument training on cross-country flight procedures specific to airplanes that includes at least one cross-country flight in an airplane that is performed under IFR, and consists of:

(A) A distance of at least 250 nautical miles along airways or ATC-directed routing;

(B) An instrument approach at each airport; and

(C) Three different kinds of approaches with the use of navigation systems;

(e) **Use of flight simulators or flight training devices**. If the instrument training was provided by an authorized instructor in a flight simulator or a flight training device:

(1) A maximum of 30 hours may be performed in that flight simulator or flight training device if the training was accomplished in accordance with Part 142 of this chapter; or

(2) A maximum of 20 hours may be performed in that flight simulator or flight training device if the training was not accomplished in accordance with Part 142 of this chapter.

Note that training in accordance with Part 142 refers to training at an FAA-approved flight school instead of training with an independent flight instructor.

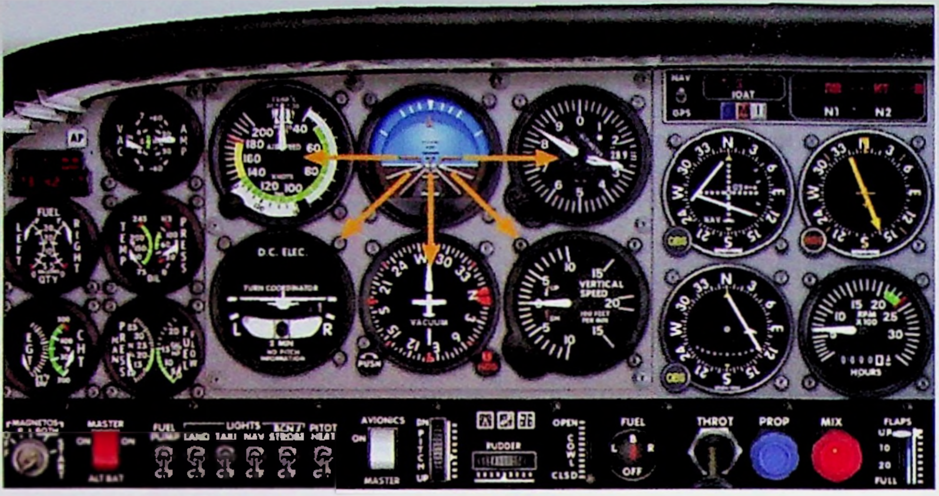
- **The ILS Approach** – This section describes 18 items of information on a typical ILS approach chart, such as for the Portland, Oregon ILS Rwy 28R approach.

If you look again at the example of U.S. requirements for an instrument rating, you'll see that there is much more to instrument training than flying approaches, including instrument flight planning, flying with ATC, navigating along designated airways, flying at designated altitudes, and experiencing occasional holds.

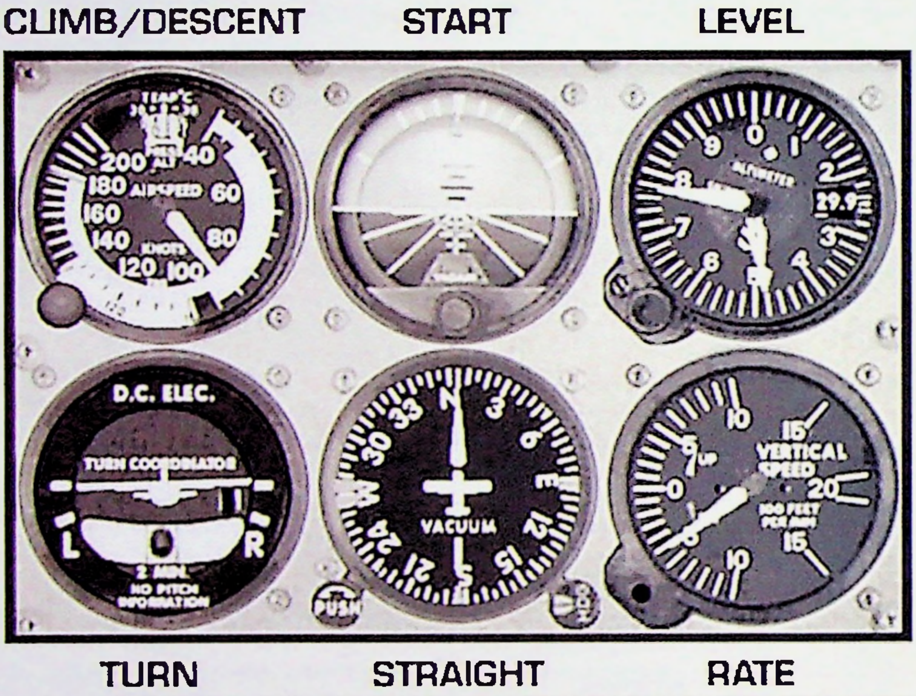
Solo Flight: Scanning the Instruments

Curiously, the instrument lessons begin with a solo flight rather than with a lesson with the instructor. The associated reading material describes the principles of instrument scanning, and according to the reading material, there are three essential steps in the effective instrument scanning process. They are to be executed every time a major attitude change is made and constantly during an instrument flight. According to instructor Rod, it should be possible to complete the three steps in 10 to 15 seconds. The three recommended steps of an effective instrument scanning include:

Step 1: Select attitude, power, trim, and confirm
Step 2: Radial scan the primary instruments.
Step 3: Trim using the VSI and monitor the Big-6 instruments (see right).



ARROWS SHOW RADIAL SCANNING OF THE SIX PRIMARY FLIGHT INSTRUMENTS, CENTERED ON THE ATTITUDE INDICATOR.



THE FS2004 LESSONS RECOMMEND LABELING THE PRINCIPAL PURPOSE OF EACH OF THE PRIMARY FLIGHT INSTRUMENTS.

To follow these steps the airplane is put in the desired attitude (pitch, bank, and airspeed), power is adjusted, and an initial adjustment of trim is applied to hold the airplane in this attitude. The primary instruments are then scanned in an organized fashion, and small corrections are made to fine-tune the airplane to the proper attitude. The final trim adjustments are made, and the airplane's new attitude is monitored on the six main panel instruments, otherwise known as the Big-6. The scan is centered on the attitude indicator, which is the "big picture" instrument, because it shows both pitch and bank.

The two articles on instrument scanning link to three more articles, which in turn describe in more detail the three steps of the scanning process. Additionally, these articles provide specific procedures for transitions among combinations of straight and level flight, climbing and descending, and turning. In each of these situations, the transition always involves A-P-T: changing Attitude, then Power, then Trim, while scanning the six primary instruments. Another helpful concept, which is shown in the related graphic, is labeling with sticky notes the primary function of each of the six primary instruments.

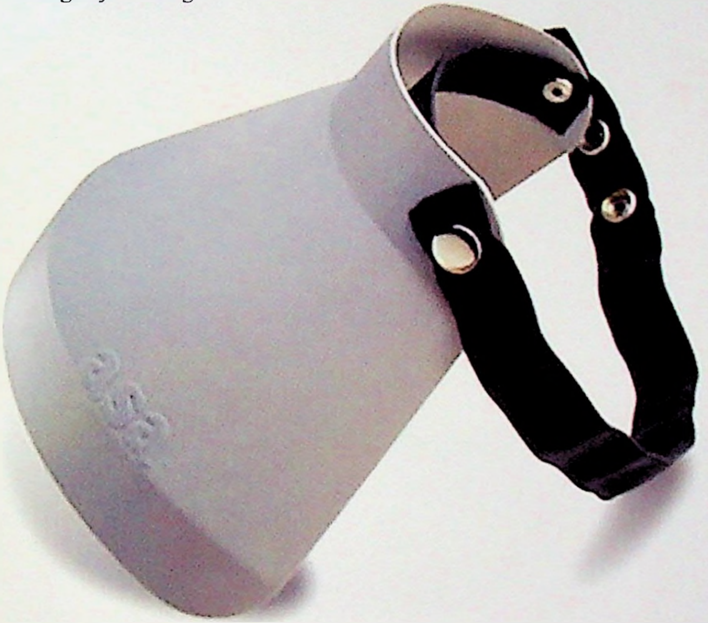
Solo Lesson: Time to Fly

When you click "Fly This Lesson Now," the first assigned solo flight doesn't display a briefing, so it's not clear what you're supposed to do. If you look at the embedded text in the flight file, Solo-Inst-Scan.FLT, in the **FS2004\Lessons\Solo** folder, you'll see the following instructions: "Practice your instrument scanning technique. Maintain your heading of 360 degrees (North) at 4000 feet. Track the SEA VOR inbound on the 360 degree course. After crossing the station, track outbound on the 300 degree course and descend to 2500 feet." The Nav1 radio will already be tuned to the SEA VOR on 116.8, and your airplane will be lined up to track the VOR inbound on a 360 degree heading. You'll start at 5000 feet, so you'll begin by making a descent to 4000. Keep the Nav1 OBS needle centered until the indicator changes from To to From, then change the OBS to 300 and begin the descent to 2500, following the techniques in the lesson.

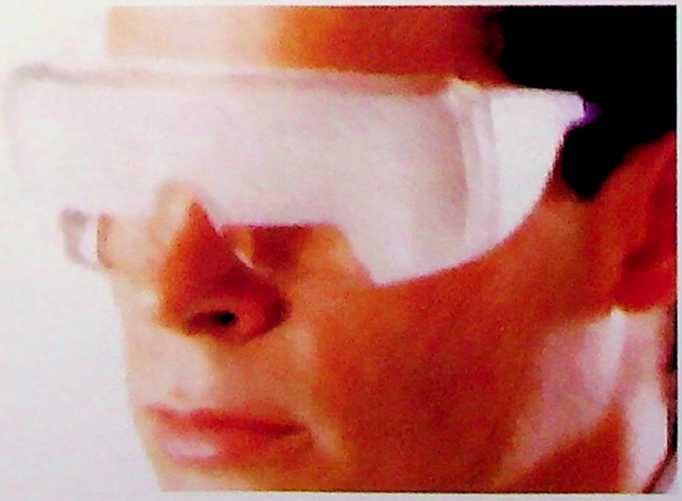
Beginning Real Instrument Training

The first stage of my training for the instrument rating was related to "attitude instrument flying," with an instructor. Consistent with the FS2004 lessons, this means continuously scanning the instruments to place and maintain the aircraft in the proper attitude to perform the desired task. My training tasks included straight and level flying, straight climbs and descents, level turns, climbing turns and descents, and, eventually, steep turns.

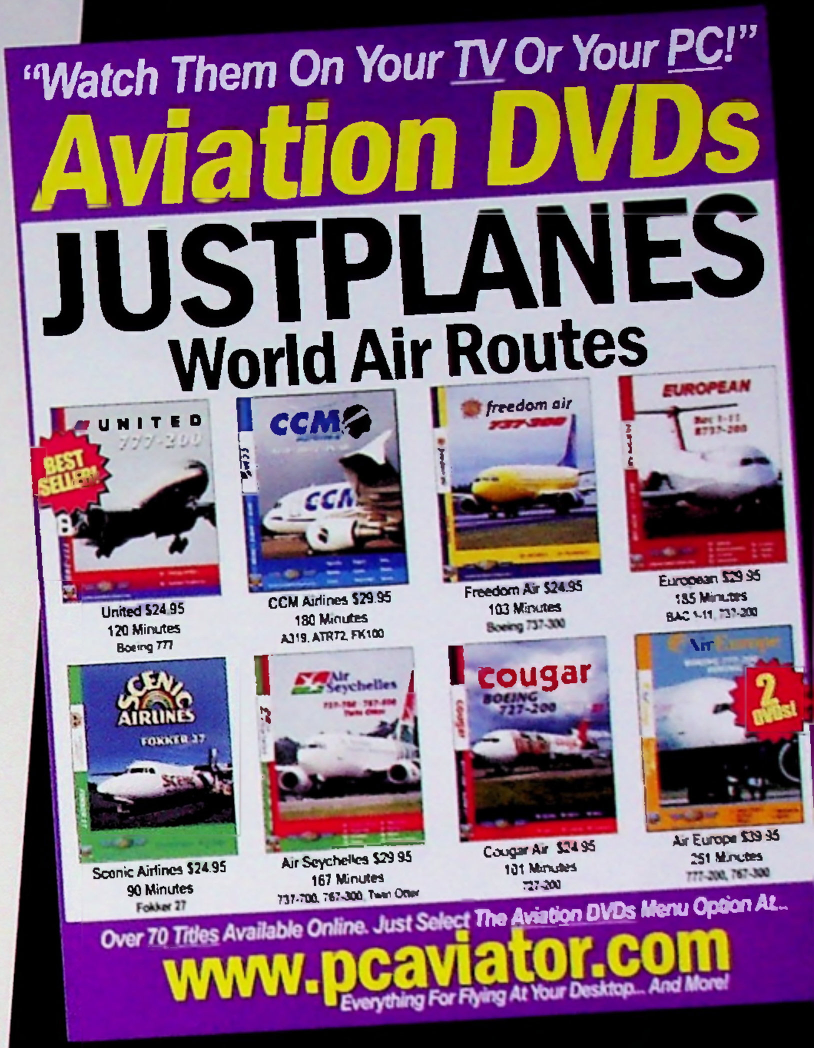
During instrument training, pilots use a "view-limiting device." As there is no required FAA approval for such devices, there are many available products that can be used. Originally, pilots wore a hood-like device that is best described as a something like a welder's mask, tapered outward to obscure all vision except the panel directly in front of the pilot, as shown in the photo. As a result of the design of this device, instrument pilots continue to use the term "flying under the hood" to describe instrument flight training while using a view-limiting device. Another photo shows the Foggles® device I used during my training.



CLASSIC VIEW-LIMITING "HOOD" DEVICE.



"FOGGLES®" VIEW-LIMITING DEVICE.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727-200

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In the U.S., instrument training requires 40 hours of actual or simulated instrument time, at least 15 hours of which must be accomplished with an authorized instructor. This means that up to 25 hours of instrument training can be accomplished without an instructor. This can be accomplished in actual flying with a Safety Pilot—a licensed pilot who looks for other aircraft as you fly under the hood in VFR conditions. I found that the best way to do this is finding another pilot who is working on his/her instrument rating, then taking turns flying under the hood and being the Safety Pilot.

In the U.S., an alternative to gaining instrument experience while flying is the use of an (FAA-approved) flight simulator or flight training device for 20-30 hours. 30 hours is allowed if the training is through a flight school, while only 20 hours is allowed with an independent instructor. During my training, using an approved flight simulator or FTD would have cost as much or more than what I was paying to rent a Piper Archer from the flying club of which I was a member, and training in a real plane is much more realistic.

"Stay tuned" in the next few issues for the continuation of this series....✈

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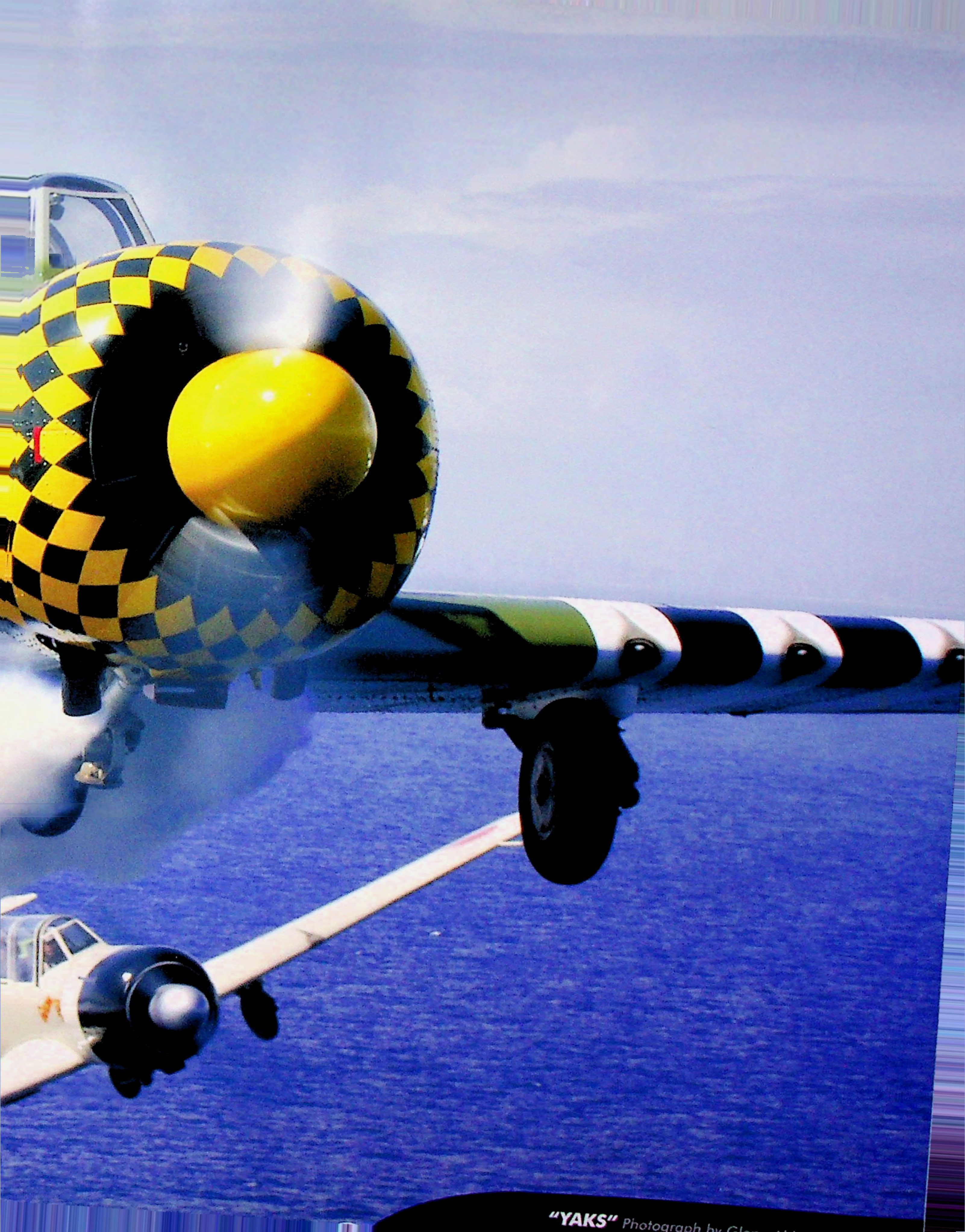


“YAKS” *Photograph by Glen*

Thunderbirds are GO!

First serial rights

BY MICHAEL GLYNN (VTB 8)

Four sparkling red, white and blue F16's sit on the runway threshold…

"Thunderbirds check?" Crisp replies come back.
"Two!"
"Three!"
"Four!"
"Thunderbirds let's run 'em up"

The fighters power up simultaneously.

"Thunderbirds, brakes release ready, now."

With practiced precision, the four aircraft begin their takeoff roll. At 100 knots their nose wheels leave the ground and then all four fighters become airborne in striking synchronicity.

"Gear up."

"Four go slot!"

Number four smoothly transitions from his outer wing position into the slot behind the lead and the famous Thunderbird four ship diamond is complete.

Back to the runway, two more F16's, Thunderbirds five and six depart with their signature takeoff maneuvers, the 360 degree roll after takeoff and split "S".

The calls are authentic, the precision is authentic. The F16's certainly look authentic. It could be any weekend on the US air show season, but this is NOT another display by the elite United States Air Force Demonstration team, the Thunderbirds.

This team is the Virtual Thunderbirds and these online pilots are separated widely by geography, in some cases by entire oceans. They are taking advantage of the widespread availability of broadband internet, and modern flight simulators to replicate what is considered to be one of the greatest tests of piloting skill, formation aerobatics.

They are one of a handful of teams around the world that can claim to have mastered this new, arcane art form. The program most of them use is LOMAC - *Lock-on: Modern Air Combat* published by UbiSoft and developed by a Russian company, Eagle Dynamics.

They will be the first to tell you that is not as easy as they make it look. Kristian (Lawndart or LD) Langdell is VTB 1, the lead pilot. A soft-spoken regional airline pilot from North Carolina, he spends countless hours leading the team in practice as they perfect the same maneuvers that the real Thunderbirds use to wow their admiring fans.

Leading any formation team is demanding. Add in the complications of internet lag and you have a whole new dimension to the challenge. LD calls every change in direction and thrust over the squads' *Ventrilo* server. He knows the show backwards and he must endeavor to start every maneuver on speed and with reference to "Show Center". He does all this while attempting to fly as smooth as silk. Any abrupt control inputs will throw his team-mates quickly out of position.

LD became the lead after hearing about the VTB's on Ubi's online LOMAC forums. His interest peaked when he heard about the first movie that the VTB's were producing and, after applying to the squad, eventually found himself learning the lead's role after one of the founders of the VTB's retired.

Now entirely comfortable with the job, LawnDart has definite views on the characteristics that online aerobatic teams must possess.

"Practice, patience and finding people with the right dedication in so many areas, not only flying skills, although that is the backbone, but above all commitment to excellence! There are several levels of how serious a squad like the VTB can be and personally I'd settle for nothing less than the same parameters the real team flies by in our appearance, although that does take some serious dedication and teamwork in every sense of the word!" he says.

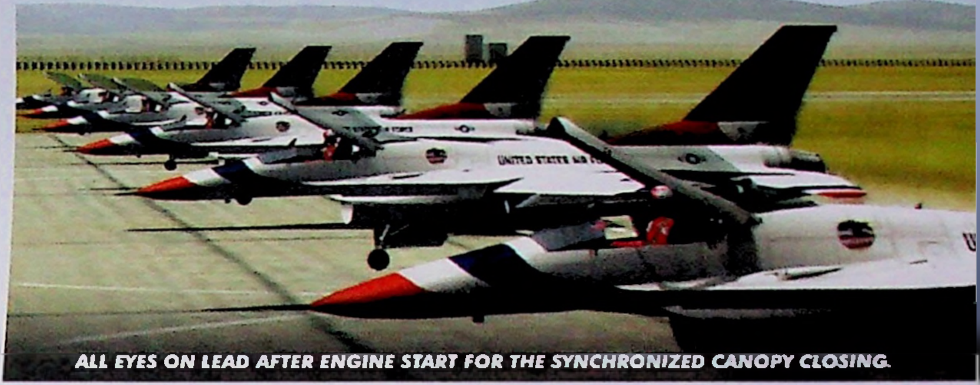
These sentiments are shared by the Number 2 (left wing) pilot, Ian (Burner) Roberts. Burner is one of the founding members of the team and has become something of a doyen of online aerobatics. As one of the most experienced pilots, his input is invaluable to newer members. Because all of the teams roll maneuvers are to the left, Burner has some unique problems to contend with. He describes the most difficult maneuvers to perform from the left wing.

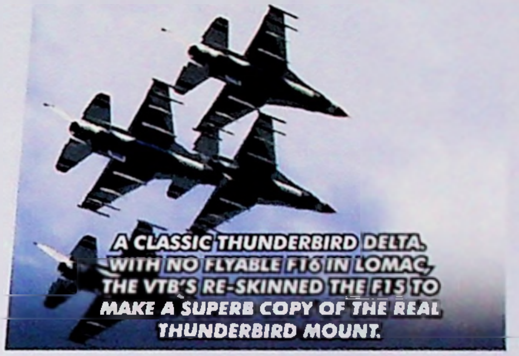
"The Line abreast loop and the Delta roll. Each is the most extreme expression of the two basic maneuvers, the loop and the roll. The Line abreast loop is difficult because you lose some of your visual cues; also as #2 you have to remain super steady for #4. Everyone in that formation knows it requires a very precise lineup- any deviation is easily noticeable.

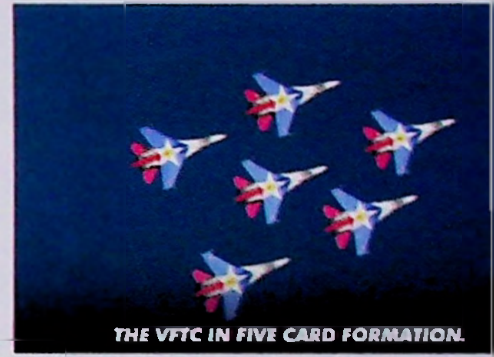
The Delta roll is hard for both #2 and #5 as Lead is rolling into you. It requires forward and left stick input which has a tendency to reverse the plane's response; sending you to the right."

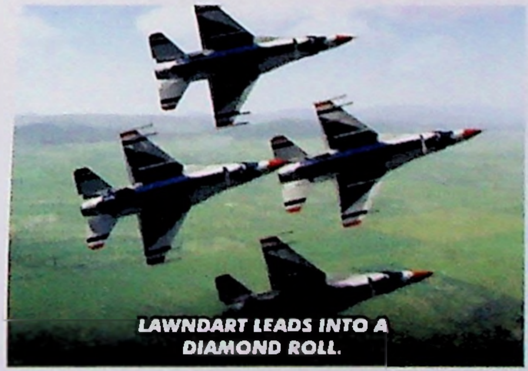
Line abreast flying over the internet is universally acknowledged as extremely difficult. The VTB's themselves were doubtful that it could be pulled off but, as with most things, practice and dedication paid off.

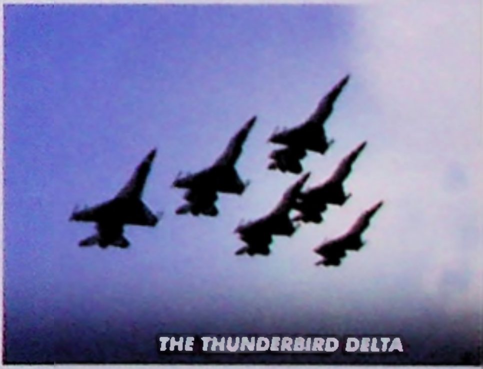
Many of the VTB pilots have pilot's licenses in real life. Two exceptions to this are the number three (right wing) and number four (slot) pilot, Cory (Silent Eagle) Parks and Kyle (Jarhead) Nelson.


ALL EYES ON LEAD AFTER ENGINE START FOR THE SYNCHRONIZED CANOPY CLOSING.

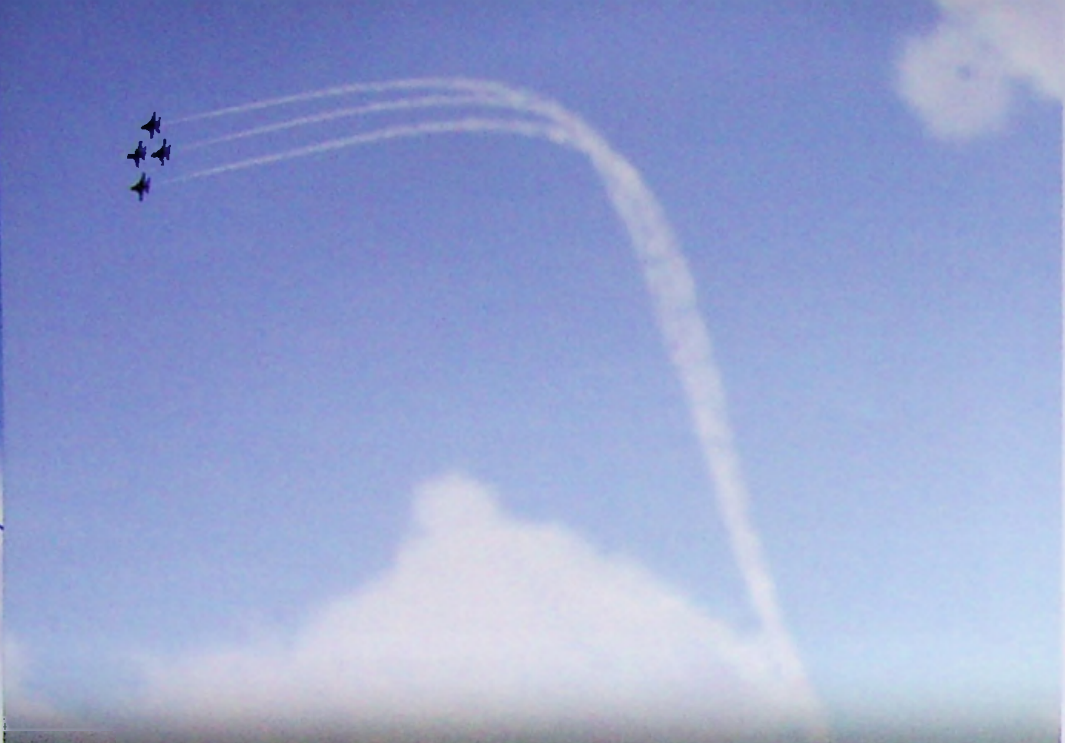

A CLASSIC THUNDERBIRD DELTA. WITH NO FLYABLE F16 IN LOMAC, THE VTB'S RE-SKINNED THE F15 TO MAKE A SUPERB COPY OF THE REAL THUNDERBIRD MOUNT.

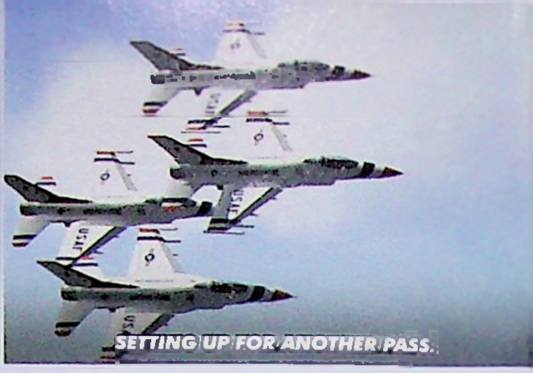

THE VFTC IN FIVE CARD FORMATION.

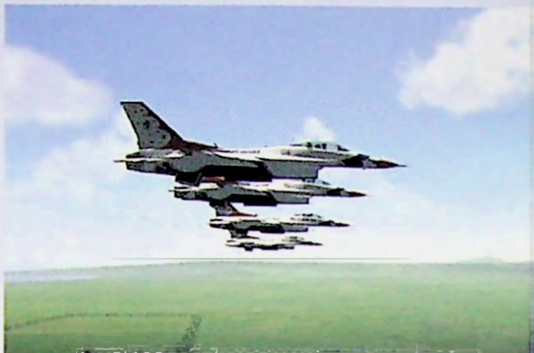

LAWNDART LEADS INTO A DIAMOND ROLL.

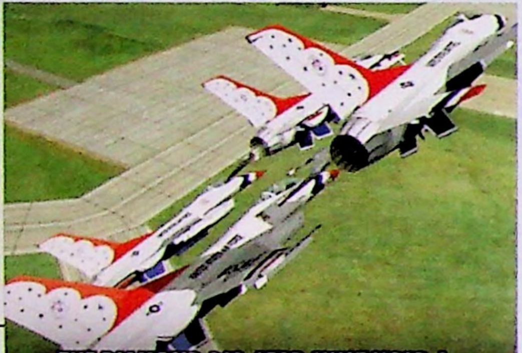

THE THUNDERBIRD DELTA

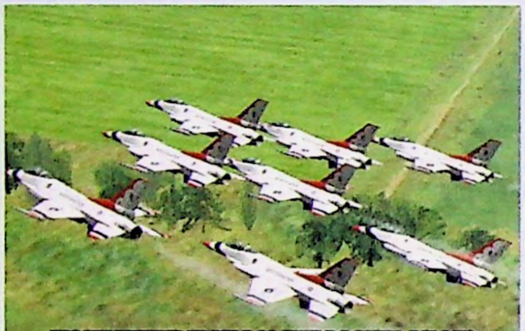
THE HIGH BOMB-BURST!

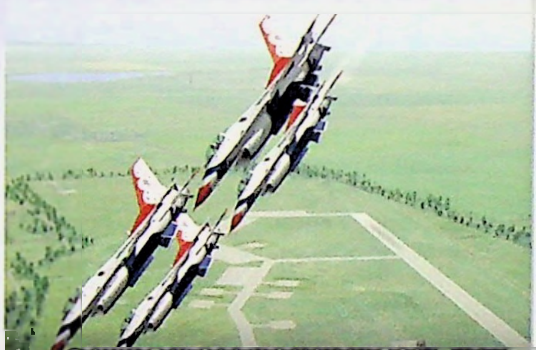

WHITE SMOKE IN THE LATEST VERSION OF LOCK-ON WAS A GODSEND TO THE VTB'S

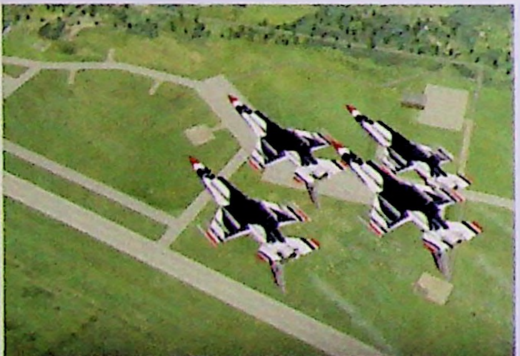

SETTING UP FOR ANOTHER PASS.

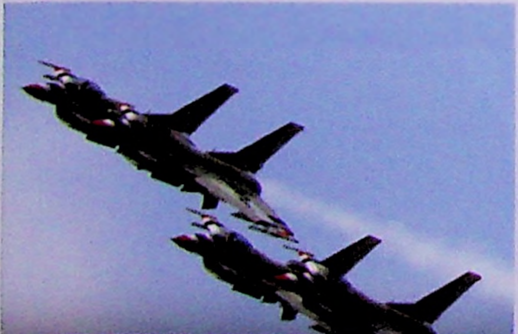

LINE ABREAST IS CONSIDERED THE MOST DIFFICULT OF ALL MANEUVERS TO PERFORM.

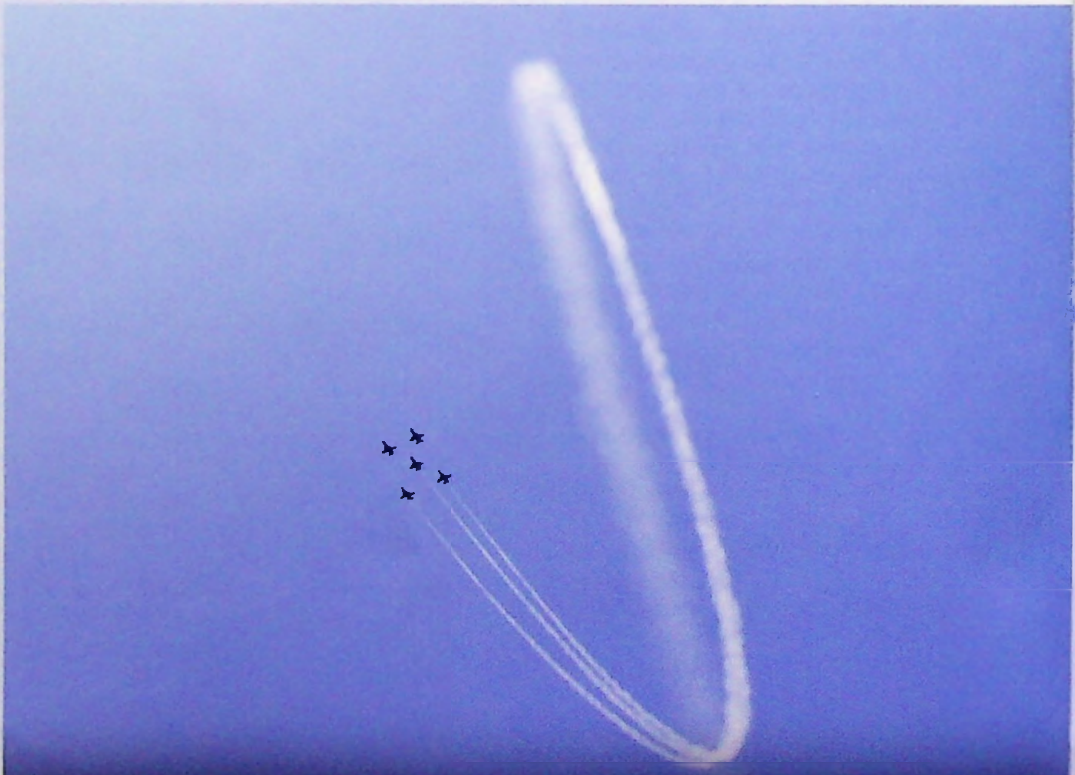

THE DIAMOND 360. LEAD MUST HOLD A CONSTANT 2G FOR THE ENTIRE LOW LEVEL ORBIT.


EIGHT THUNDERBIRDS? THE BACKUP PILOTS COMPLETE THE CLASSIC THUNDERBIRD RETURN TO BASE FORMATION.


COMING OUT OF THE DIAMOND ROLL. NOTE THE "CROWD" ON THE AIRFIELD!


ALL EYES ON LEAD AS THE DIAMOND GOES OVER THE TOP IN A ROLL.


THE DIAMOND PASS IN REVIEW. NOTE THE OVERLAPPING FORMATION POSITIONS.


THE FIVE CARD LOOP. EXTREMELY DIFFICULT!

Silent Eagle is a 17 year old formation prodigy and a student. He is responsible for putting together the eye-catching videos that the team produces. He also handles the demanding flying on the right wing with aplomb.

Jarhead is a computer technician who is slated to join the Marines. Before he does that though, he would like to see the team progress from the production of videos to putting on a live internet show in front of a real audience. This is the ultimate ideal for most of the team but the number of people able to view a live show is limited by server restrictions.

Filling out the Thunderbird Delta are the two solo pilots, Christopher (Striker) Curtis and Benjamin (Toast) Booy, who occupy the seats on jets five and six. Striker is a USAF technician who was also one of the founding members of the VTB. He explains how the dream of a formation team has developed.

"Initially it was just 3 of us and we wanted to explore the art of formation flying. LOMAC was the first online sim where you can do that. I aspired to take formation flying out of the context of "flying in echelon" and take it to where no one had gone with it... actual aerobatics. I never would have thought in my wildest dreams the VTB's would be where it is now."

The international characteristic of the current team is highlighted by "Toast", VTB6. Ben is a native of the UK but lives and works in the US as a pilot for a regional airline. He shares the dream of putting on a live show, but would like to take it several steps further.

"I hope to see the team evolve as the real one does, with the chance for new pilots to move into positions in the lineup as the seasons revolve. Maybe get some affiliation with the real team, and perhaps in the future, fly a display at a real air show, indoors of course! Can you see yourself in the main building at Oshkosh, mic in hand in front of a crowd and a whacking great TV screen, commentating on or flying in the show? That would be beyond imagination."

That has actually been accomplished by another team, The VFTC or Virtual Flying Training Center, based in Moscow. The VFTC have the advantage of living in close proximity to each other and hence are able to practice using a LAN instead of an internet connection. With zero lag, the videos they produce are smooth as silk. Their latest video incorporated their showstopper, a box formation, an awesome piece of flying that no real team would dare contemplate as there is nowhere for some of the pilots to bug-out to in case something goes wrong.

The VFTC have appeared and performed their routine live at major Russian air shows such as the MAKS 2005 event. This they do by projecting various images from their individual computers on to a large projector screen inside a hall filled with an appreciative audience. To keep the realism high, they perform with collisions and fuel consumption ON. The VFTC are gathering quite a following; at the time of writing they had put together almost 20 live performances at air shows and live online events that they periodically run. A VFTC demonstration pilot, Mikhail "Searcher" Fatov tells what it was like to perform "live" at an air show... *"it was an amazing feeling to do what we like to do and do it not only for ourselves. We all were delighted with the shows and the watchers were happy too. There were many ovations and people have shown a lot of interest..."*

The VFTC is also currently putting together its latest video, the release of which is coincidentally timed for about when the new Virtual Thunderbird video will be released, in late summer, early fall. There is a lot of interest in comparing these new releases; for while the teams maintain friendly contact, there is no doubt that each will be trying to outdo the other.

Competition? While it seems to be the logical next step, there needs to be improvements in the ability of programs to handle the attendant lag that can be caused by large numbers of spectators. LOMAC does have a spectator mode that will allow spectators to either sit on the virtual grass in front of the control tower, or view the action close up from the comprehensive views offered by the program. Fill up the server with too many spectators though and the game becomes a slideshow, making precision formation impossible. While that will undoubtedly be less of an issue in the years to come, it places real limitations on the ability of spectators to watch in real time.

For the time being though, videos and live performances at air shows remain the only viable ways for the respective teams to showcase their talents.

So what do you do if you consider yourself a hot stick 'n rudder pilot and wish to join one of these elite teams? Both teams are on the lookout for talented pilots. Be aware though that the ability in air-to-air combat in these games is no predictor of success as a formation aerobatic pilot. But as they say, some background is desirable but not essential. The VTB gets many applications. The screening of these pilots falls to the team's back-up pilots.

One of these is VTB 7, Mike "Bon Jobie" Jobe, currently a 737 pilot for Southwest Airlines. Bon is the deputy lead of the team who, while learning the ropes for that demanding role, also screens new applicants and leads them through preliminary testing or "Phase One" of the application process. Applicants fly in the slot position with Bon leading them through some straight and level, then some gentle turns. It quickly becomes obvious if an applicant has potential to go further.

Bon has no illusions about what it takes to make it as a Virtual Thunderbird. "*My best advice would be to learn everything you can about the real Thunderbird team, their history, their purpose, etc. Then learn everything you can about the VTB's. Learn the SOP's (standard operating procedures) cold. Practice, practice, practice. Have a great attitude, learn how to take constructive criticism, and have fun.*"

If a pilot progresses to Phase Two of the process, he/she gets invited to practice with the team itself. The time it takes to perhaps be offered a slot on the team is then up to the applicant himself. Pilots generally master all the maneuvers in the slot position before trying either the left or right hand wing and deciding to specialize in one or the other. From there it is a matter of learning the show and waiting to fill one of the prime slots should one of the team retire or take an extended break.

The Thunderbirds have a website - **www.virtualthunderbirds.com** - which has become a Mecca for formation enthusiasts. Screenshots and movies as well as formation flying tips can all be downloaded from the site.

The VFTC have a web presence at **http://www.virtualflight.ru/index_en.php**

Both these teams enjoy setting the current standard for online formation aerobatics. But they remain hopeful that other teams with the same talent and drive will emerge to make this a growing and exciting facet of internet flying. ➔

BATTLEFIELD OPERATIONS SERIES
FALCON 4.0
ALLIED FORCE
TEEN
PC CD ROM
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graphsim entertainment
FEATURING NEW OPERATIONS THEATER THE BALKANS

Falcon 4.0: Allied Force Review

BY DEREK "BARON" DAVIS

The very first flight sim I ever played was Falcon on the Apple Macintosh computer back in the late 1980s. Someone brought it into work one day and I was hooked from Day 1!
I had many a tussle with my main adversary, a character who hailed by the name of the "Black Bandit". The monochrome display did not detract from the excitement and sheer exhilarating fun of the product. Ironically, the very first flight sim I ever owned for the PC was Falcon 3.0. This for me captured the essence of aerial combat. It had depth, fidelity and authority, all of which combined to draw you in and suspend your disbelief.

Released in 1998, Falcon 4.0 carried on that lineage, however, its initial release was met with a little disappointment; being hampered by "bugs" and various technical issues. Although many of these issues were eradicated through various patches and third party upgrades many felt that, in some respects, Falcon 4.0 had fallen a little short of its initial expectations.

Now we have a new version in this "series" - *Falcon 4.0: Allied Force (F4:AF)*. Designed by Lead Pursuit, this particular release strives to attend to the major issues of the original by providing a more stable product. In addition, it provides improvements and enhancements to the original simulation that combine to add a fresh and new experience to this franchise.

The Falcon 4.0 concept

According to the original designer of Falcon 4.0, Gilman Louie, Falcon 4.0's primary aim was to put the player's head into the war, not just the aircraft itself. The designers wanted to suspend your disbelief and give the player a better understanding of a pilot's role in a large-scale engagement. The essence of the Falcon series, as Gilman Louie has said, has always been balancing the campaign with the flight simulation component. Falcon 4.0: Allied Force is therefore comprised of two distinct simulations: the Campaign and the Air Combat Simulation; with each having equal billing in the product.

On the Air Combat side, Falcon 4.0 comprises of a high fidelity flight model, detailed avionics and a totally interactive, photorealistic, clickable cockpit. The Campaign system consists of thousands of units moving, reacting and ultimately fighting throughout the Falcon virtual universe. The game engine continuously maintains and updates every component in this world allowing you to watch a virtual war unfold right in front of your eyes.

In essence, Falcon 4.0 is a flight simulator and a strategic war game rolled into one. Together they provide all the elements that go together to make up a combat environment; elements that are so often missing from other flight sims. This is why Gilman Louie always asserted that the Falcon series was not designed just to simulate an F-16, but more importantly to simulate the whole fighter pilot experience. So now that we have an idea of the design concept behind this simulation, let's see what F4:AF has brought to the battlefield.

New Feature set

Falcon 4.0: Allied Force brings the original sim right up to date by introducing a raft of improvements and additions to an already comprehensive suite of features. For example, Lead Pursuit have made sure that the sim now has contemporary hardware support with regard to processors, graphics cards and current Windows operating systems. A new Balkans Theater of Operations has been added, with 18 new or upgraded campaigns being introduced. A new Multiplayer game engine and interface has also been created. On the graphical side of things the graphics engine has received a face-lift in the form of improved lighting and shading, enhanced buildings, vehicles and aircraft modeling. The landscape is the next area to see an improvement, with the introduction of new high-resolution terrain mesh and accompanying textures. Other improvements to the rest of the simulation include enhanced Artificial Intelligence (A.I.), Airbase Control, and ATC. You will also see an improvement in weather and atmospheric conditions, as well as improved weapon performance. Now that we know about the new added features to the software, let's take a look at the package as a whole.

Flight sim structure

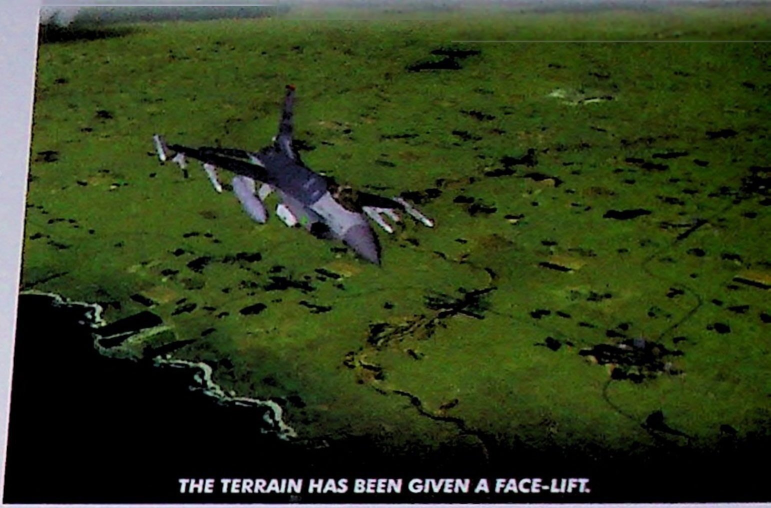
Manual

The manual comes in two versions; a shorter 110-page "Quick Start" printed variant and a more in-depth 716-page full-color PDF version. The former is a "Basic Operations" manual and is designed to get you into the sim quickly. However, if you want to get the full benefit and understanding of the whole simulation, I would urge you to 'study' the PDF manual, which is more detailed and comprehensive. The latter is essentially the original Falcon 4.0 manual, with certain parts of it being updated to take into account the changes incorporated into F4:AF. The larger version also includes a set of detailed tutorials that 'walk' you through every aspect of flying and operating the F-16. Personally, I would have preferred both manuals to be printed, although a 716 page printed manual would be bulky and heavy and add to the overall product cost.

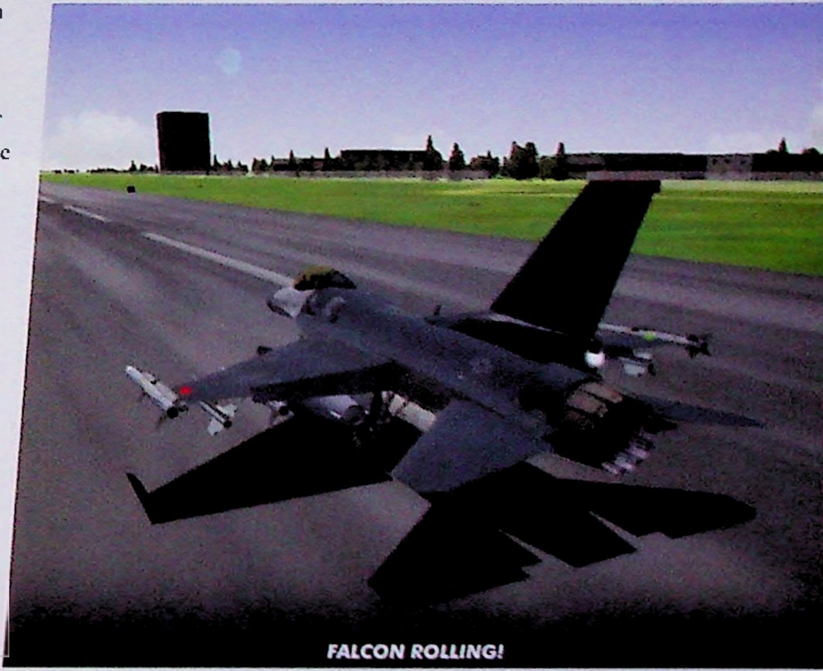
Falcon Menu

The first thing you will notice on launching the new sim is a slick video sequence. This consists of various sequences showing F-16's taxiing, taking off, dogfighting, using HUD displays etc. all of which help to set the tone of the simulation. In fact, the striking thing I have always admired with this series is the quiet, but sophisticated air of authority that the product conveys. This air of quality is mirrored in the new Falcon 4.0 menu interface, which is rendered in varying cool shades of grey.

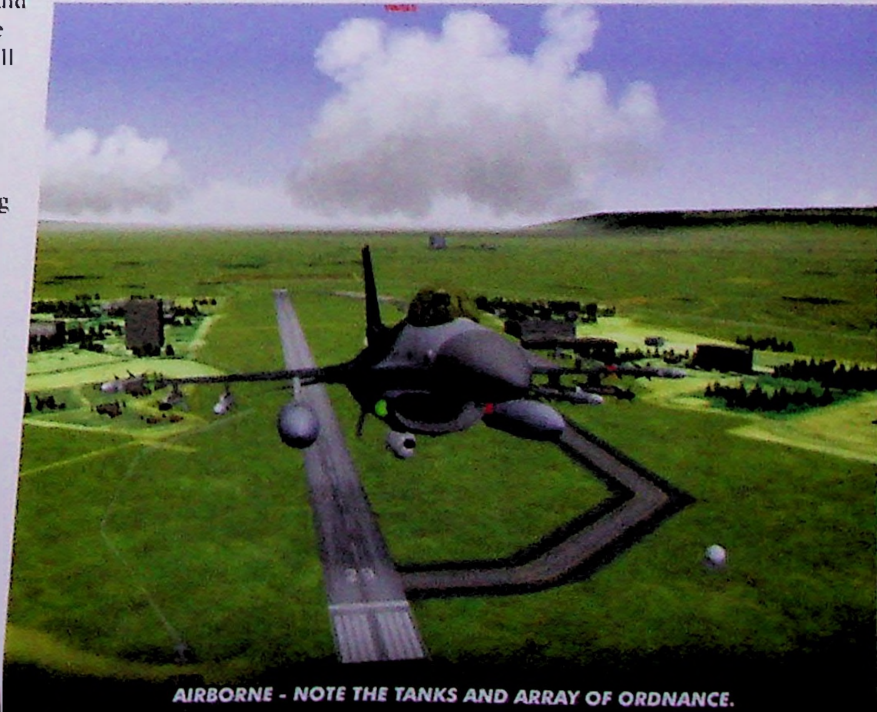
The menu itself is split up into various sections, giving you access to different parts of the simulation. If you are new to this sim or just want a quick blast, *'Instant Action'* will probably be your first port of call. Here you are placed in the thick of the action and have the choice of engaging airborne or land-based targets. Alternatively, you could launch the *'Dogfight'* module.



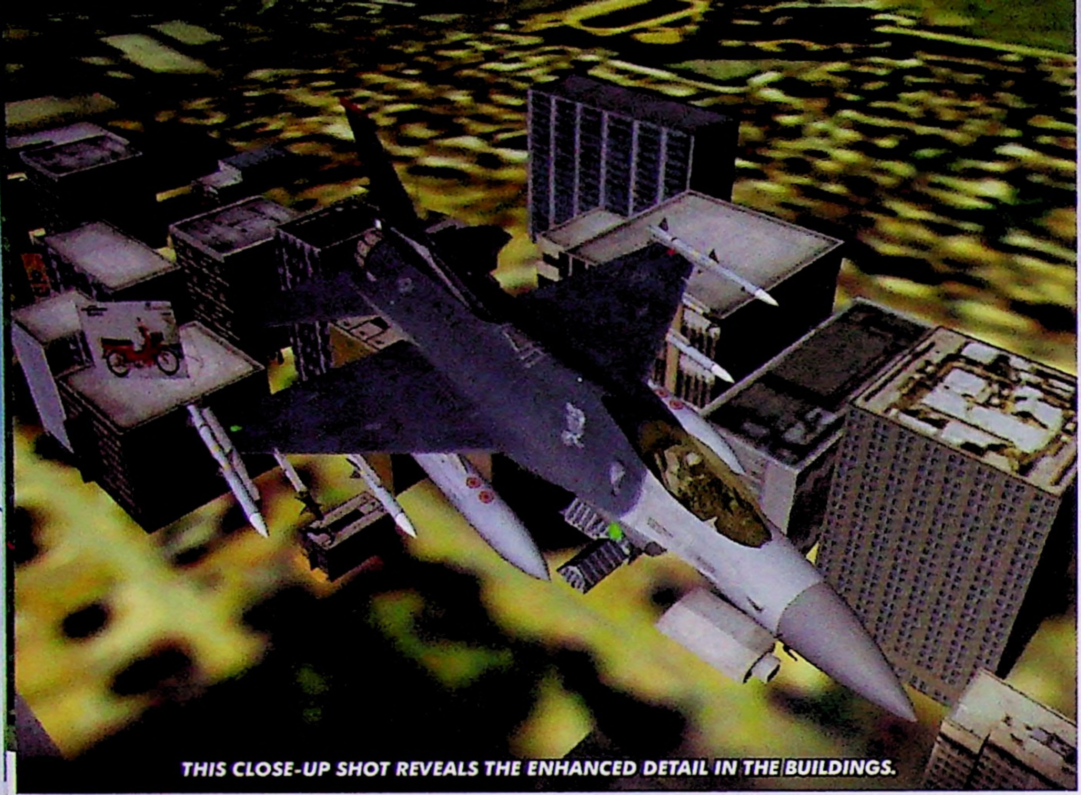
THE TERRAIN HAS BEEN GIVEN A FACE-LIFT.



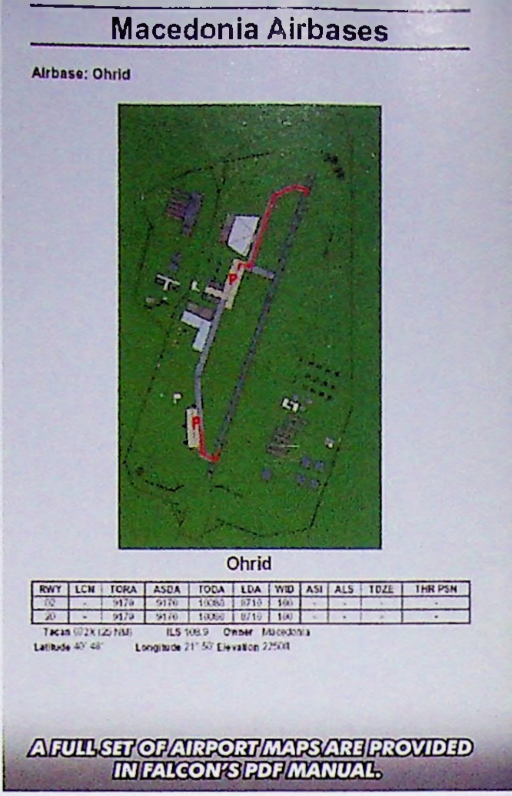
FALCON ROLLING!



AIRBORNE - NOTE THE TANKS AND ARRAY OF ORDNANCE.



THIS CLOSE-UP SHOT REVEALS THE ENHANCED DETAIL IN THE BUILDINGS.



Macedonia Airbases

Airbase: Ohrid

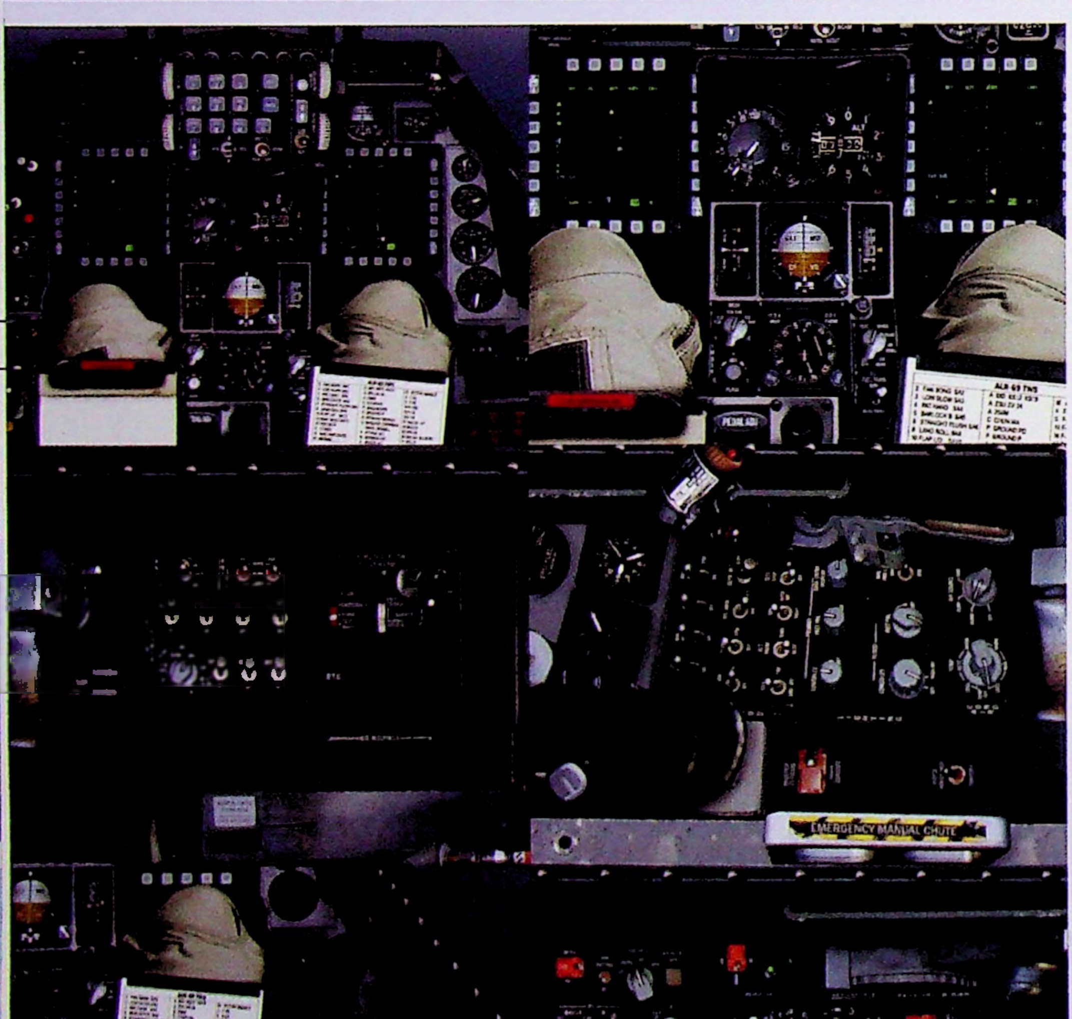
Ohrid

RWY	LCN	TORA	ASDA	TODA	LDA	WID	ASI	ALS	TDZE	THR PSN
02	-	9179	9170	10085	8710	100	-	-	-	-
20	-	9179	9170	10080	8710	100	-	-	-	-

Tacan 072X (25 NM) **ILS** 108.9 **Owner** Macedonia

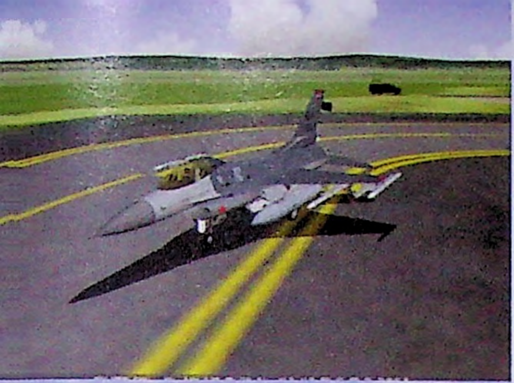
Latitude 40° 48' **Longitude** 21° 57' **Elevation** 2250ft

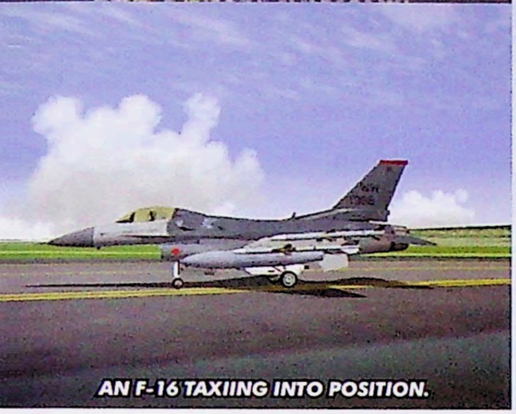
A FULL SET OF AIRPORT MAPS ARE PROVIDED IN FALCON'S PDF MANUAL.



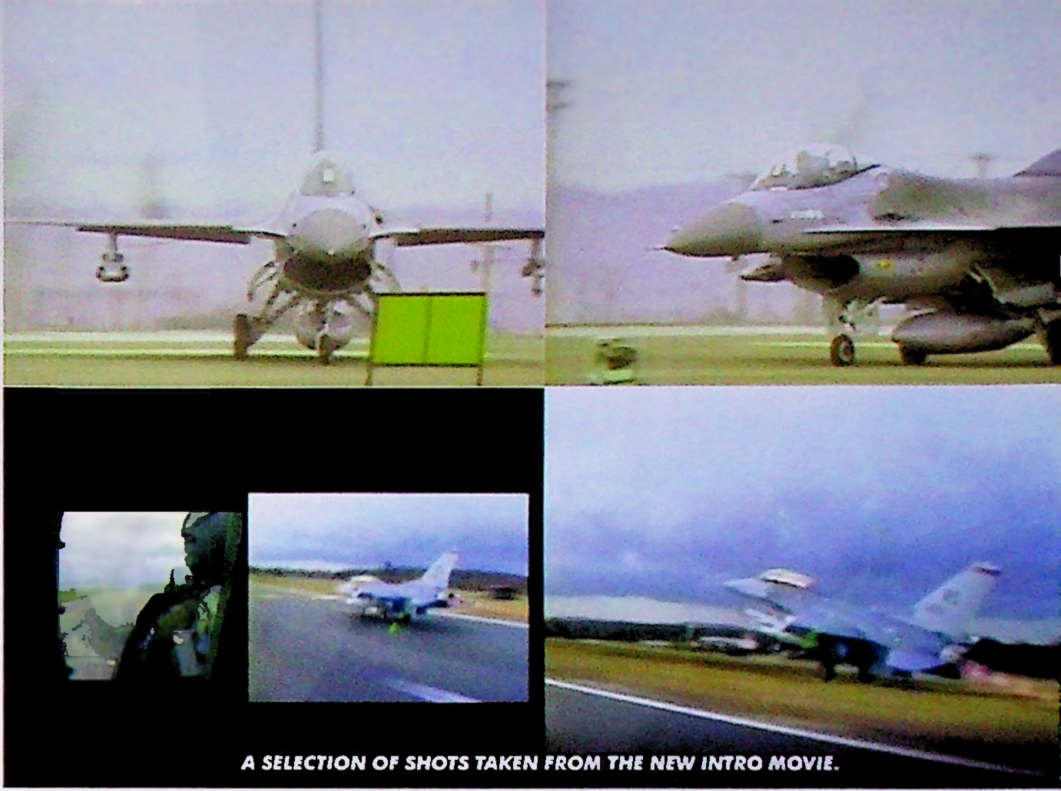
A FINE STUDY OF FALCON'S F-16 AND THE SURROUNDING TERRAIN.

AN EXAMPLE OF THE NEW CLOUD EFFECTS.

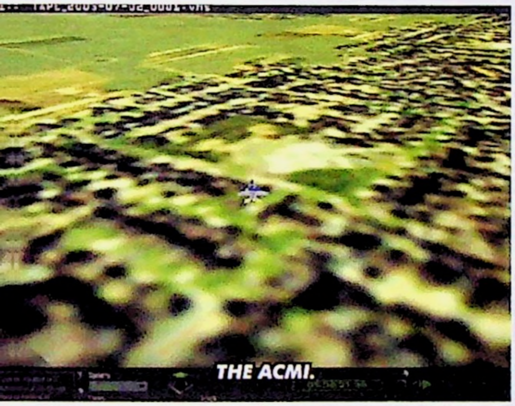




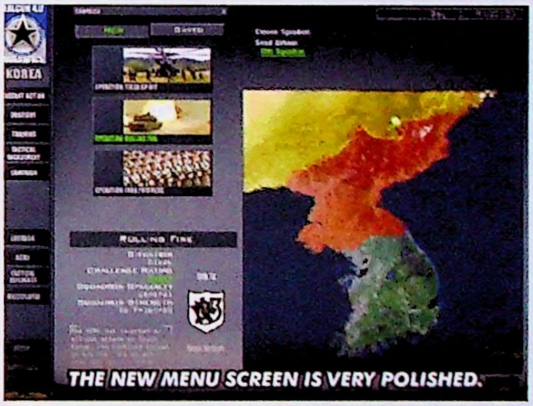
AN F-16 TAXIING INTO POSITION.



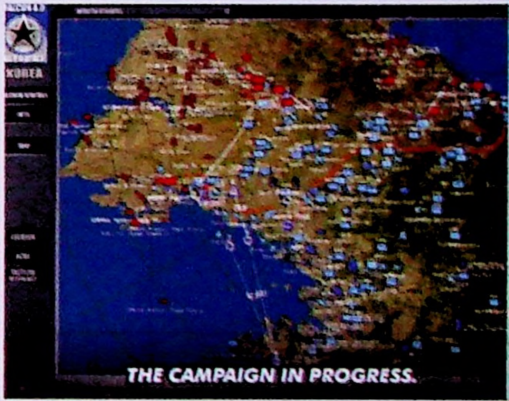
A SELECTION OF SHOTS TAKEN FROM THE NEW INTRO MOVIE.



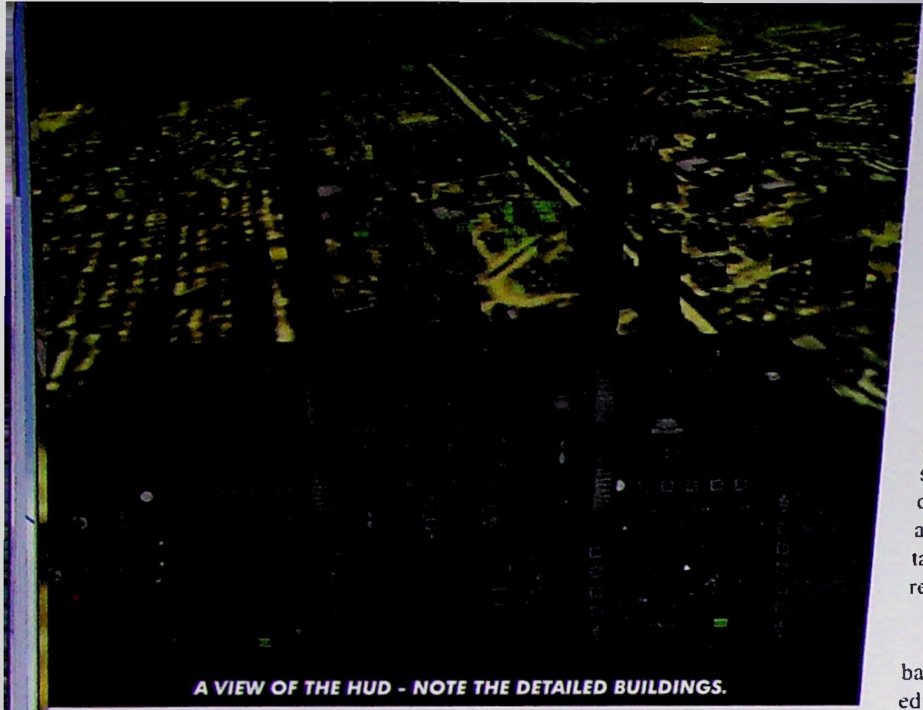
THE ACMI.



THE NEW MENU SCREEN IS VERY POLISHED.



THE CAMPAIGN IN PROGRESS.



A VIEW OF THE HUD - NOTE THE DETAILED BUILDINGS.

SPLASH 1 BANDIT!

AN F-16 TAXIING BACK TO ITS HANGAR.

This is slightly different to the former section because you have the option to create teams between you and the A.I. and real people. This module is great for honing dogfighting skills, and also team play. Then there is the *'Training'* module which is used in conjunction with the training tutorials contained in the PDF manual. These take you through the various aspects of flying the F-16 and in operating its various avionic systems. Unlike some simulations, there are no audio or text overlays to accompany each training mission, so the missions have to be flown in conjunction with the text from the PDF manual. As I read through each tutorial, I 'alt-tabbed' between the simulation and the PDF manual. However, this occasionally caused rendering problems when I returned to the simulation. The alternative method is obviously to print out the manual. You can take the CD to any good print shop and they can do it for you for a reasonable price.

'Tactical Engagement' is the next item on the menu and is basically a sophisticated mission module in which you can fly, edit and create individual missions. In creating your own missions you have control over the choice of aircraft, ground units and mission routes. Essentially, it allows you to practice various types of battlefield scenarios in preparation for the big *Campaign*.

The *Campaign* is the next item, in which you assume the role of an F-16 pilot assigned to a squadron. Your squadron is taking part in a conflict in either the Balkans or Korea. Your success or failure in each mission has an impact on the progress of the war, however, the war carries on and progresses regardless of whether you fly or not. Furthermore, the Campaign evolves dynamically and in real time and is unscripted.

Other items located in the menu are used outside of the virtual world. The first is the *'Logbook'* which records your pilot's details such as call-sign, number of kills, rank achieved etc. Then we have *'ACMI'*, or Air Combat Maneuvering Instrumentation, which is a very detailed mission recorder, allowing you to review every aspect of your mission. Finally we have the *Tactical Reference*, which is a reference guide for every aircraft, unit or weapon located in the simulation. A valuable feature within this section is the ability to listen to the radar warning signature of every aircraft in the F4:AF world.

I should also mention that F4:AF also provides a full setup and configuration suite for your peripherals. However, one issue I did encounter in this area was the fact that my rudder pedals were not recognized by the simulation. My Saitek X52 joystick comes with a twist action, which *was* registered by the sim, so I used this for the rudder axis instead. I contacted the developers about this issue and they informed me that this problem would be corrected in an upcoming patch, which will probably be available by the time you read this piece. Now that we know about the external workings of this sim, let's take a close look at the internal world of F4:AF.

The Flight Simulation world

The Cockpit

When you are first dropped into the new surrounds of the F4:AF cockpit, the first thing that strikes you is the photorealistic appearance of every dial, instrument and display. F4:AF's F-16 'pit' is absolutely exquisite. This alone is worth the entry fee! Nearly every item has a function, so the biggest problem you will encounter is in understanding what each one does. The detail contained within means that the learning curve of this simulation is relatively steep. Information overload often occurs, particularly in a fast moving jet. That's why it's so important to study and practice each of the tutorials supplied with the sim.

Learning how to use the onboard radar and its various modes of operation, as well as interpreting the information concurrently displayed on the HUD is a prerequisite to mastering the combat side of this simulation. To understand the F-16's avionics, you have to understand the conventions of 'Master' modes and 'Sub-modes'. All radar modes in the F-16, be they air-to-air or air-to-ground, are controlled under this principle.

One other thing I should also mention is the fact that F4:AF supports the X and Y axis of NaturalPoint's TrackIR device when using the virtual cockpit. This in itself alters your experience of Falcon 4.0.

Moving to the exterior view, we find a world that may not be as polished as the current state-of-the-art simulation - *Lock-On;* it is nevertheless of a very high quality. This is particularly applicable to the F-16 that the player flies. To be honest, a sim of this age should still not be looking this good.

When it comes to the virtual environment, things look a lot richer and more detailed than the original Falcon 4.0. This is particularly noticeable with the increased detail of the cities, the volumetric clouds and enhancements across the landscape. The developers have also added a new fog feature that adds to the immersion factor.

I couldn't end this section without also mentioning the comprehensive communication suite contained within F4:AF. For me this is as important as the visual side of things, because it helps to immerse you into the world of Falcon. It provides you with a multitude of ways to communicate with the entities within the simulation and allows them to communicate with you. The ultimate effect is almost seamless and adds to that air of authenticity.

The Campaign world

It would be fair to say that Falcon's longevity can be largely attributed to its detailed Campaign module. Now with 18 new campaign scenarios, F4:AF has raised the bar even more.

Essentially the Campaign engine allows you to take part in a large-scale dynamic battlefield scenario, whose outcome is decided not only by the actions of the player, but also by those of the computer-controlled aircraft and ground forces. In essence, we have a series of actions and reactions. The Campaign is continually running, whether you are merely in the 'User-interface' or flying in the cockpit of an F-16. F4:AF features six battlefields. Three are based in the Balkans Theater of Operations and three in the Korean theater. Once placed in the scenario, you will experience action involving air, ground and naval assets.

As a pilot you can choose the squadron you want to fly with, as well as choose your mission from a list of sorties being generated by Headquarters. The Campaign in the game is created by the Air Tasking Order or ATO. This is referred to as the 'Frag', short for Fragment. This is a large document that covers every Airforce and Navy aircraft in the Theater. Your squadron is allocated its missions via the 'Frag'. The mission schedule represents the 'Fragement' of the ATO that has been assigned to your squadron in the form of your mission schedule. Any missions you do not fly are flown by the A.I. You can fly many sorties a day and the Campaign can last many days. Although you are one of many elements, your success or failure will have a direct impact on the outcome of the larger strategic situation.

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www.simkits.com

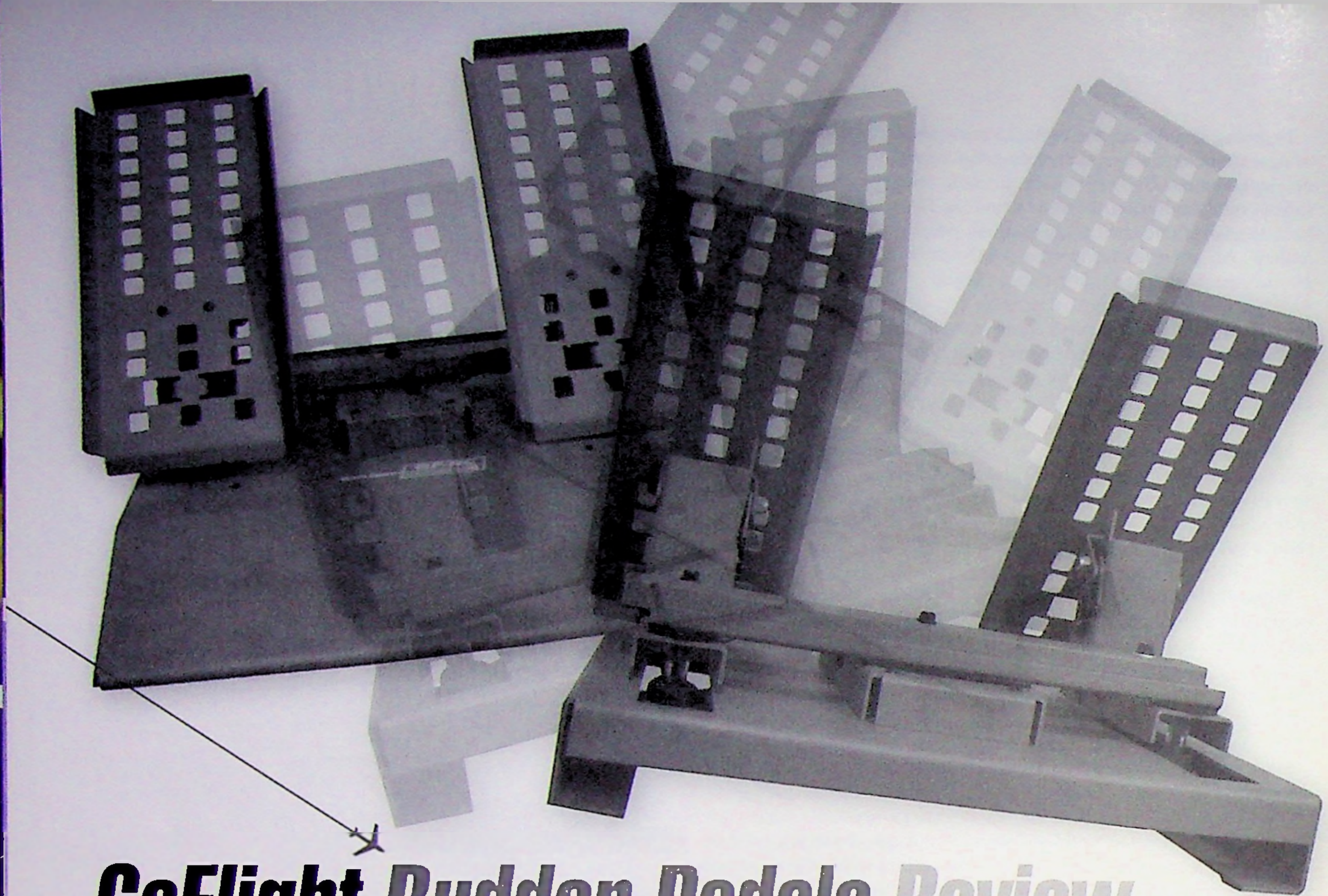
When the Campaign starts, you can change the Campaign priorities. For example, you can change the type of target attacked, the number of sorties flown against a particular type of target, for example, a SAM site etc. You can also change the particular area your forces are concentrated against.

The whole battle is presented on a top-down view of the region. Air, land and sea elements are presented as icons, which move in front of you, the speed of which is determined by how quickly you set the clock to advance - for example, at real time (x1), at twice real time (x2) etc.

The unique feature of this ATO mode is that you can give orders to all the allied air and land assets via a mouse-click menu system. For example, you can order aircraft to change height, speed or even return to base. You can also create new packages to execute specific tasks. For example, if you feel a bridge needs destroying in a certain area, you can create a flight to achieve that goal. In addition, you can jump in and take part in the mission if you wish. You even have the ability to order ground assets, such as battalions, to move to specific areas. While the war rages on, radio communication and messages being relayed between the various assets can be heard, giving you a constant update on the ebb and flow of the battle. In fact, I have spent whole evenings just watching and listening to the campaign progress on my screen in front of me, without ever venturing into the cockpit!

Conclusion

For many, Falcon was the king of all combat flight sims. It looks like the 'King' has returned bigger and better than ever... Long live the King!
Falcon 4.0: Allied Force retails for US$29.99 and is available from all good software retail stores. ✈



GoFlight Rudder Pedals Review

BY TODD FREDERICKS

Years ago I spent a lot of money for some controllers, specifically, a synthetic feel joystick, a yoke system, and a set of rudder pedals, only to find out that they didn't do the job that I was expecting them to do. After I discovered that affordable commercial controllers simply do not replicate the feel of a real airplane, I resolved myself to using a Microsoft Sidewinder II joystick because, if I couldn't have realistic feel, I might as well have value, reliability and simplicity.

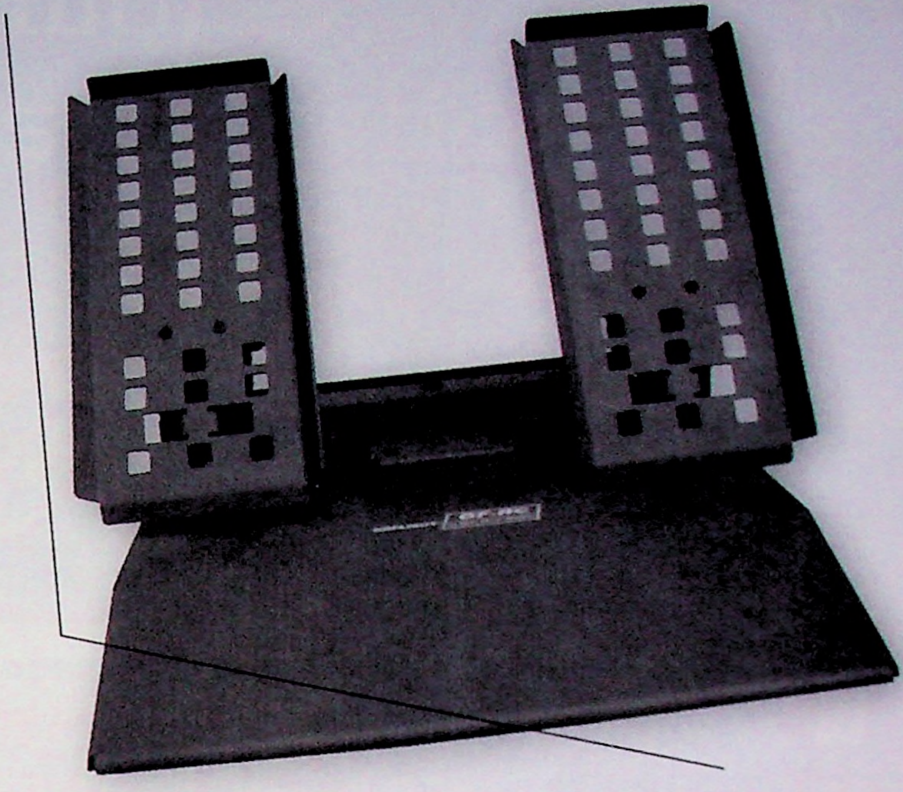
But I have never stopped looking for reliable, accurate and affordable controllers. Unfortunately after seven years I have purchased and kept only one throttle quadrant because I just couldn't handle multi-engine flying without a handful of levers. I have not been impressed with much of anything else on the market, but now I am pleased to say that I might be changing my mind about buying a set of rudder pedals.

GoFlight Inc. has introduced a rudder pedal product called the GF-RC (GoFlight Rudder Control). For about US$325.00 you will buy a set of rudder pedals which will leave you very pleased; at least it left me with a good feeling overall and a willingness to buy a set of them.

One of the major gripes I have with affordable sim controllers is that they lack the solid feeling of real airplane parts. When you climb into a King Air you sit down in a seat that is locked to the floor and you can set you feet up onto rudder pedals that are bolted to the airplane. Nothing moves in any manner other than the way it is supposed to. This allows for better control during flight. This is not the case with a great many controllers on the market today. Many of the affordable-for-the-masses products are made of plastic and bungee cords and have a tendency to slide around and feel very 'cheap'. This is, at best, not realistic and, at worse, a frustrating experience that I believe results in a lot of these controllers ending up on auction sites for sale.

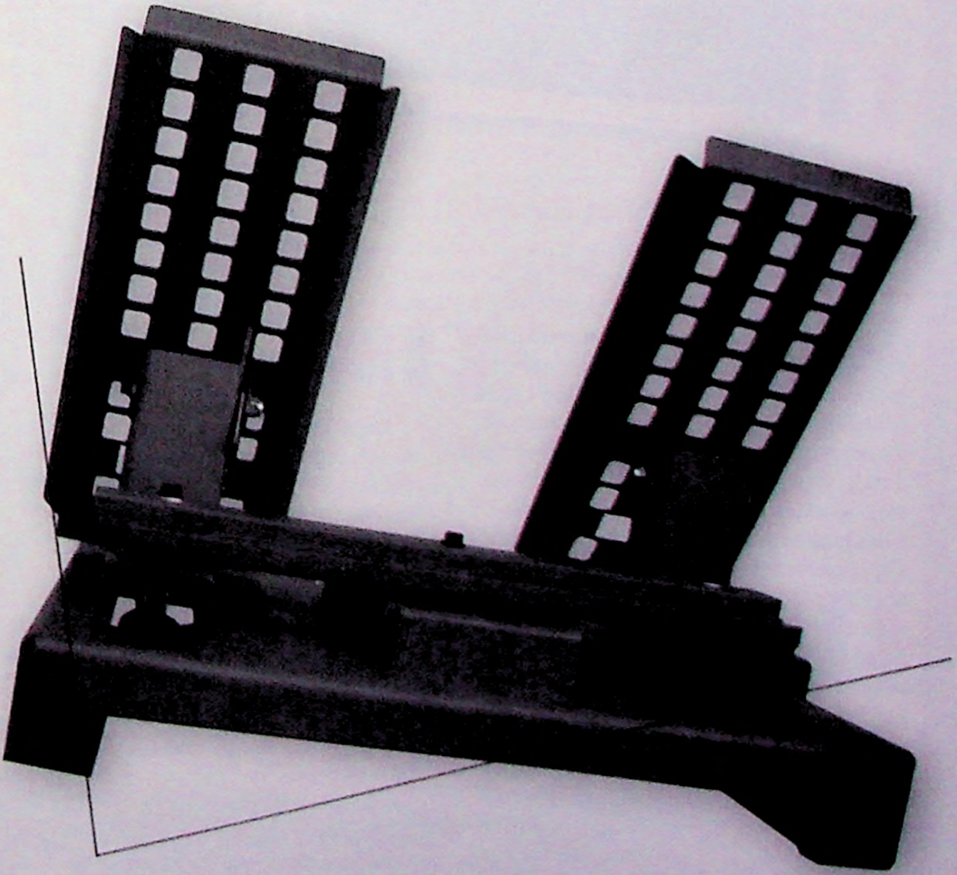
The GF-RC arrives in a substantial box that has definite heft to it. When you open the package you are confronted with a well-packaged piece of equipment that is actually larger than you might expect. The software and the appropriate cables are neatly arranged for easy access and the unpacking has a logical sequence to it as you remove all the components.

In order to ship the unit as flat as possible it is necessary for GoFlight to send it partially disassembled. Lest that cause worry, the assembly requires that you only install eight screws and attach two springs. All the hardware and tools are included for this operation and the result is a set of very solid pedals that don't move unless required. Everything that moves under your feet is made of heavy grade steel and the interfaces to the various potentiometers are well made and protected by the steel housing. This is essential because, as with real aircraft, pedals incur the greatest amount of force applied simply because you use your feet to control them. I recently spent a good deal of money repairing rudder pedals in my own Cessna 172, because after 6000 hours of use the pedals and their attachment brackets were worn out. I have never heard of anyone wearing out a yoke or a throttle.



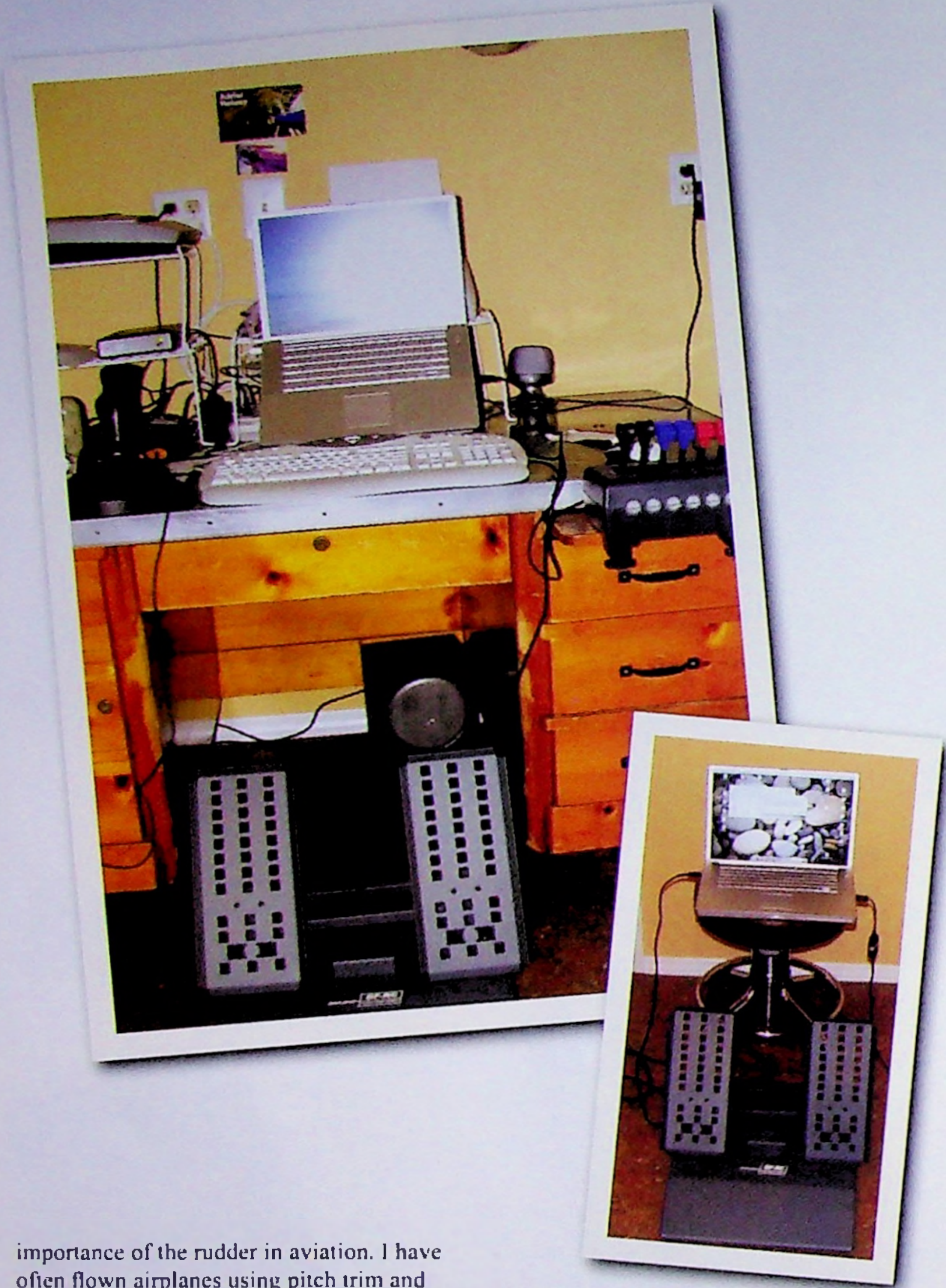
Once assembled you can also apply the self-adhesive rubber feet to the bottom of the steel housing that supports the pedals. While they look rather small, they are extremely effective at keeping the GF-RC from sliding on linoleum or slippery surfaced floors. I made several aggressive full cycle right to left pedal inputs as well as full forward braking efforts and never once did the unit move. Very impressive.

Once set up, the pedals are much larger than the pedals in a Cessna 172. In fact they feel much like the King Air or like those pedals found on an A320. The spacing is very similar and they allow you to place your feet fully on the pedals for enroute flying or with your heels on the housing when taxiing, so you don't end up over-braking.



My system is very straightforward. I use a Sidewinder joystick, a throttle quadrant and a Macintosh G4 Power Book for simming. I also use X-plane primarily because I have found X-plane to be very easy in terms of configuring preferences. I was not disappointed with the GF-RC either. I attached the USB cable, selected the Joystick and Settings option from the X-plane menu and was rewarded with confirmation that the pedals were signaling properly. A few mouse clicks to assign the proper controls to the unit and I was off. The pedals were set up just as easily with Microsoft Flight Simulator as well.

Wolfgang Langeweische wrote a seminal tome called "*Stick and Rudder*". Among real world pilots it's one of those must-haves that goes into great detail about the



importance of the rudder in aviation. I have often flown airplanes using pitch trim and rudder alone for control. An airplane's rudder is capable of influencing both yaw and roll. Because of this you can raise a dropped wing during an uncommanded roll, and you can also command a turn. In short it is not an overstatement to say that in conventional airplanes (a flying wing is a different animal) the rudder is a more critical control surface than ailerons. As an example, there are airplanes like the Mitsubishi MU-2 that do not even have ailerons but retain a rudder.

Because of this, a good test for any set of pedals is to go out and fly a circuit using only pitch and rudder for control. This is a test easily performed in the sim by simply disabling roll control assignments from the stick or yoke you are using.

Departing from KSFO in a third party Beech 1900 model, I noticed how smoothly the airplane responded to steering and braking commands from the GF-RC. GoFlight claims some 200-position increments across the travel of the unit. The pedals make it very easy to control the aircraft during taxi and initial takeoff roll, and the feeling of solid control rapidly checked my skepticism of the unit. Once the brakes were off (accomplished by a quick tap on the tops of the pedals) I dropped my heels to the housing and just used the pedal centers for steering. Rotation was smooth and after raising the gear and cleaning up the flaps I reduced power and pulled the props back to a cruise setting.

Using only rudder control, rapid pedal deflections resulted in the very familiar yawing that would have left people in the back reaching for the air sickness bags. At no time was there any jerky quality to the motion. External views showed the rudder deflecting stop to stop smoothly and without visual distortion.

Commanded rolls to 60 degrees of bank followed by a release of the stick were easily leveled by applying opposite rudder, and again, the cycle was smooth and demonstrated initial yaw in the deflected pedal direction followed by a roll back to level. Applications of rudder throughout both slow and barrel rolls resulted in predictable response and the use of "top rudder" was very efficient at raising the nose of the airplane. Again, the entire maneuver was smooth and the pedals felt very solid and firm throughout.

The final test was a normal ILS flown in the default X-plane 777. The HSD showed a 14-knot right rear-quartering crosswind as I was vectored for the 7L approach at KLAX. I had disengaged the autopilot at 10,000 feet and found the pedals to be very realistic during vectoring maneuvers over the Pacific. Once I intercepted the localizer the crosswind correction was very easy to maintain using rudder alone. In fact, after years of using a twist stick for rudder, it was very satisfying to hold the localizer using pedals alone. The crosswind started to reduce below 200 feet but alignment was easy to maintain with slight inputs.

Once over the threshold with the GPWS sounding off I reduced power to idle and began the round-out to flare. At 20 feet I kicked the pedals to align the nose and almost simultaneously I felt the mains touch. Roll out was a non-event with not a single hint of over-control.

If I have one complaint it is that, during preparation for this review, my emails to GoFlight support were not answered in a timely fashion. This is no reflection on the quality of the unit but it may be a consideration if one was to have future problems and needed support.

The unit price might seem a bit steep, but for a bit extra over what you might pay for a top-end graphics card, you will get a unit that will serve you very well for a long time.

The GF-RC pedals are available to order from most good flight simulation product retailers, or from GoFlight direct. Check their website to find a GoFlight retailer near you – **www.goflightinc.com** ✈

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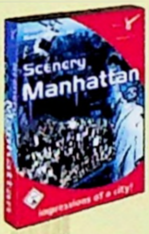

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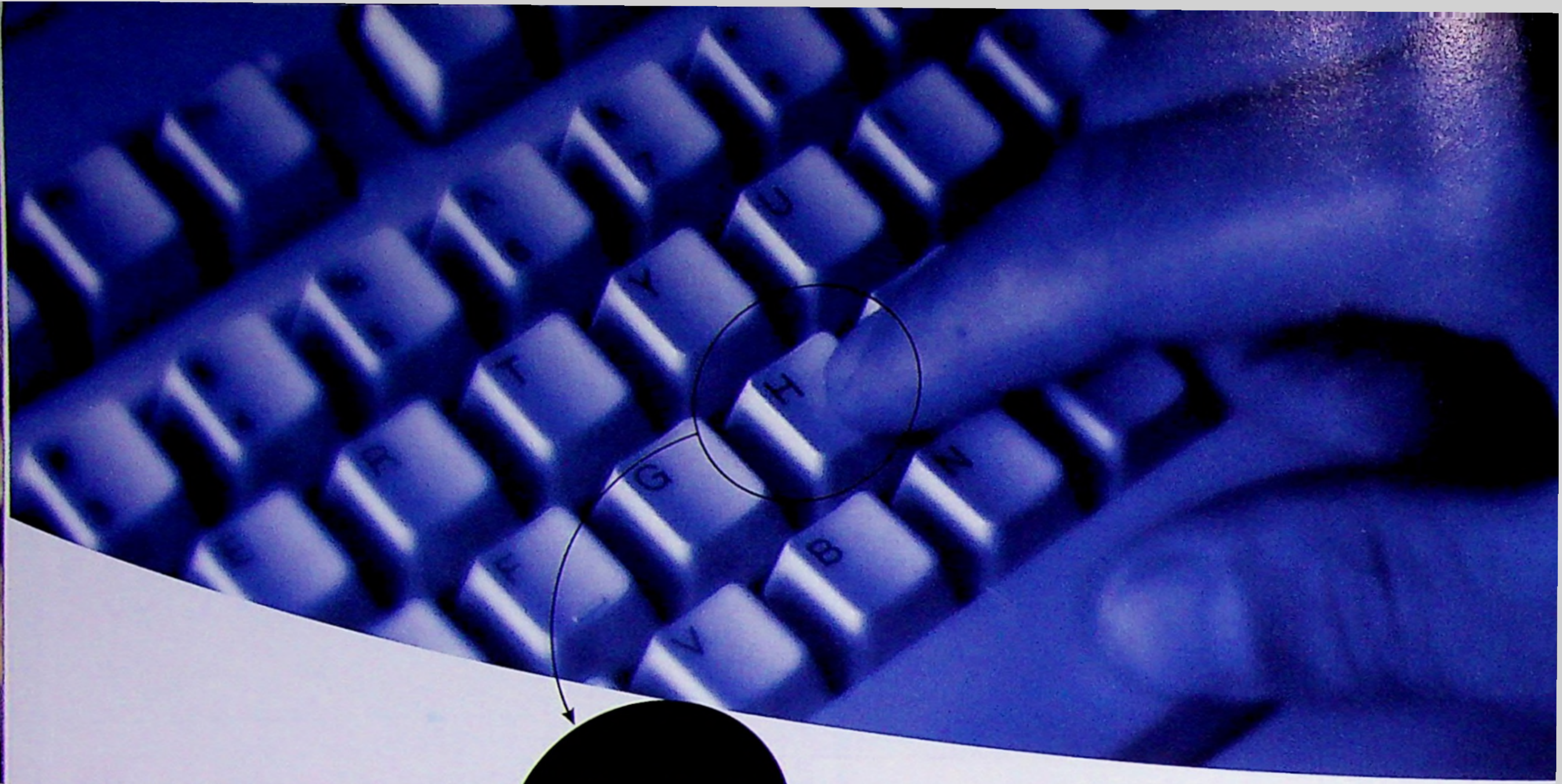


HORTON'S HINTS for FS2004

BY DOUG HORTON

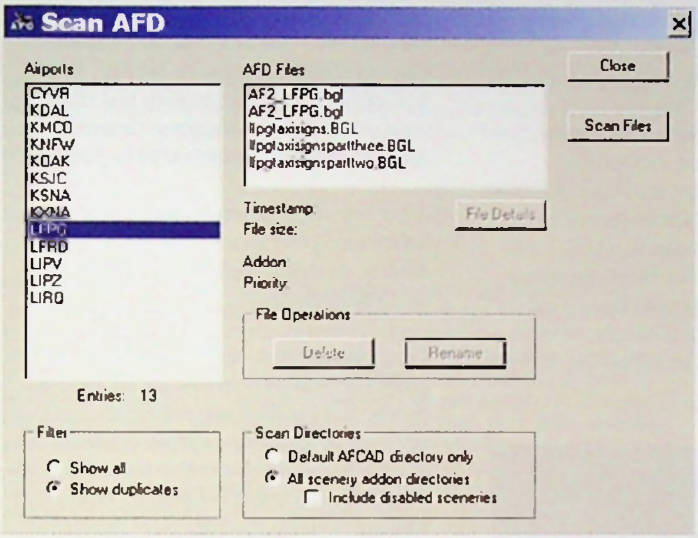
Here are more hints for FS2004, collected from various sources, including my own discoveries in "flying" the program. Some are basic, some are advanced, and some important hints are repeated from previous installments of this series. Whatever your level of experience with the program, I offer these hints for your flight simulation enjoyment. Take your pick and give 'em a try. "Practice makes perfect!"

Eliminating Duplicate AFD Files

As I continue to add new scenery at airports, I find that many scenery authors are providing AFCAD files with their scenery – to enhance parking of AI aircraft or otherwise modify the airport and facilities data (AFD) for particular airports. Most of the airport scenery authors suggest that you copy their AFCAD files to the customary ..\FS2004\Addon Scenery\scenery folder. On the other hand, some authors include their AFCAD files with their scenery files, so it may not be obvious that you're adding another AFCAD file.

If you're heavily into AI aircraft and using add-on airport and facilities data (AFD) files made with Lee Swordy's wonderful AFCAD2 program, you may have duplicate AFD files. An easy way to check for this is using Eliot Rogers' freeware *ScanAFD* program, available as **ScanAFD.zip** at popular file library sites or at Eliot's website at **http://www.nwlink.com/~erog**

The program reads ICAO codes from each add-on AFD file installed and provides a straightforward means of identifying duplicate airports and renaming or deleting these files. The program searches for AFDs within add-on scenery files and identifies duplicate files. The program will also display facilities details from within each AFD (parking spots, parking codes and runways), providing more information to help you decide which files to keep or delete. You can also rename the suffix to other than "bgl" in order to deactive the file. There are a few possibilities for "false positives," such as an occasional "exclude" file or a scenery file that is otherwise interpreted by ScanAFD as an AFD file.



Airports: CYVR, KDAL, KMCO, KNFW, KOAK, KSJC, KSNA, KXNA, LFPG, LFRD, LIPV, LIPZ, LIRQ

AFD Files: AF2_LFPG.bgl, AF2_LFPG.bgl, lfpgtaxisigns.BGL, lfpgtaxisignspartthree.BGL, lfpgtaxisignsparttwo.BGL

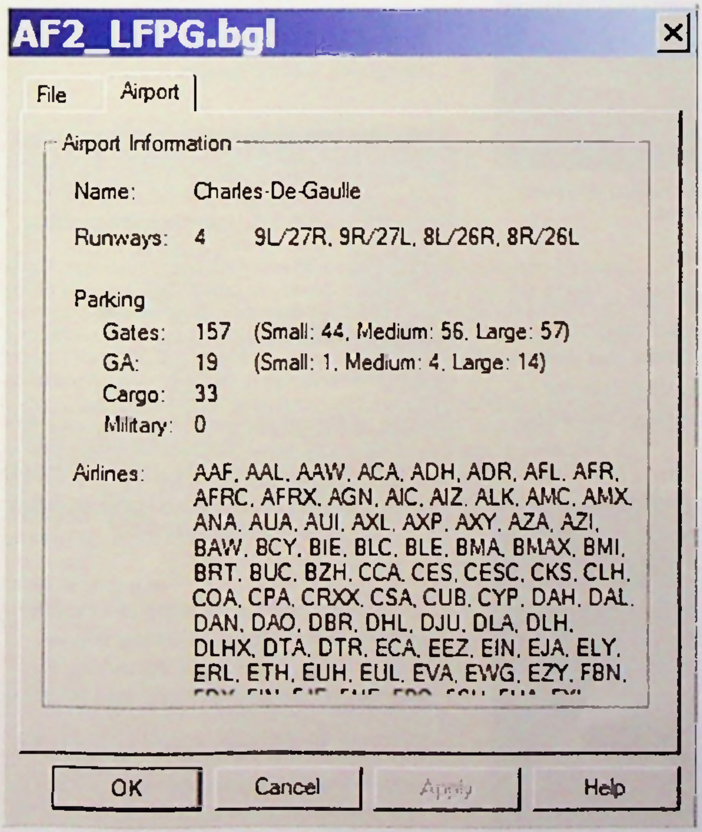
Timestamp:
File size:
Addon
Priority

Entries: 13

Filter
○ Show all
● Show duplicates

Scan Directories
○ Default AFCAD directory only
● All scenery addon directories
☐ Include disabled sceneries

SCANAFD IDENTIFIES DUPLICATE AFD FILES FOR LFPG AND OTHER AIRPORTS.



Airport Information

Name: Charles-De-Gaulle

Runways: 4 9L/27R, 9R/27L, 8L/26R, 8R/26L

Parking
Gates: 157 (Small: 44, Medium: 56, Large: 57)
GA: 19 (Small: 1, Medium: 4, Large: 14)
Cargo: 33
Military: 0

Airlines: AAF, AAL, AAW, ACA, ADH, ADR, AFL, AFR, AFRC, AFRX, AGN, AIC, AIZ, ALK, AMC, AMX, ANA, AUA, AUI, AXL, AXP, AXY, AZA, AZI, BAW, BCY, BIE, BLC, BLE, BMA, BMAX, BMI, BRT, BUC, BZH, CCA, CES, CESC, CKS, CLH, COA, CPA, CRXX, CSA, CUB, CYP, DAH, DAL, DAN, DAO, DBR, DHL, DJU, DLA, DLH, DLHX, DTA, DTR, ECA, EEZ, EIN, EJA, ELY, ERL, ETH, EUH, EUL, EVA, EWG, EZY, FBN,

SCANAFD SHOWS AFD INFORMATION TO HELP YOU DECIDE WHICH DUPLICATE FILE TO KEEP.

"Must Have" Files

Flightsim.com provides a list of downloadable "must have" programs and files that may enhance your enjoyment of FS2004. Many of these include textures that may be utilized by scenery add-ons, but which may not be furnished by the scenery author. To locate the list of "must have" files, go to http://www.flightsim.com/cgi/kds?mZMIo03C=main/filemust.htm.

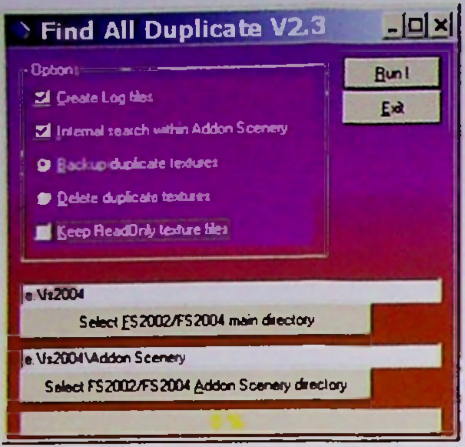
- Airport 2.x: Free airport scenery design program.
- Airport 2.x textures: Free common scenery textures.
- VOD Textures: Free common scenery textures.
- ASD 2.1 Textures: Free common scenery textures.
- NOVA Textures: Free common scenery textures.
- NOVA Gold Textures: Free common scenery textures.
- Rwy12 Object Placer: Free scenery design tool, with object library.
- Gerrish Gray's Trees: Alternative scenery textures for trees.
- FSNavigator: Shareware flight planner, moving map and autopilot.
- TrafficTools: A free utility by Lee Swordy to program AI aircraft traffic.
- AFCAD 2: A free utility by Lee Swordy to add parking for AI aircraft, as well as edit airport and facility data, such as taxiways.
- EditVoicepack: A free utility by Lars Moellebjerg to add missing callsigns, airline names, and airport names to FS2004's ATC vocabulary.

Eliminating Duplicate Texture Files

Typically, when you download and extract add-on scenery packages, you'll extract with folder options turned on. Some add-on scenery authors provide *all* needed textures in the add-on scenery texture folder, while others add textures to the main FS2004\Texture folder. Often, authors design their scenery sets with textures provided by FS2004 or provided by programs or texture collections such as Airport, VOD, Nova, or Nova Gold (see above). The result is that after downloading and installing many scenery packages, you'll likely have duplicate texture files in the main FS2004\Texture folder and add-on scenery folders, which increases flight simulator loading time and may increase computer memory use.

An easy means of attacking this issue is using Gerard Durand's freeware *Find All Duplicates* program, found on popular file library sites as **fnddup23.zip**, **find_all_duplicate_v2.3.zip**, or other names. When a duplicate texture is found, it can be moved to a backup folder (the default option) or it can be deleted, which is usually not a problem because the file has also been found in the main FS2004\Texture directory. Backed-up files are placed in folders under each texture folder from which they're removed. Backing up is safer because you can always restore your textures files, but if hard drive space is an issue, deleting duplicate textures can save lots of disk space. Gerard suggests that a good solution is to make backups in a first step, and when you have verified that your sceneries display correctly, you can delete the backups manually. After developing confidence in the program, you can delete them directly.

Perhaps you're thinking the program will only occasionally find duplicate textures. Consider my recent experience: I installed Tom Jones' scenery for multiple airports in Arkansas (**Arkscenry.zip** at popular file library sites) and noticed that the program included 438 texture files! After installing the scenery, I ran *Find All Duplicates*, which found that 272 of these textures were already in my main FS2004\Texture folder. The program then invisibly backed them up and removed them from the Arkansas scenery's \texture folder.


Find All Duplicate V2.3
Run!
Exit
Select FS2002/FS2004 main directory
Select FS2002/FS2004 Addon Scenery directory

Options
☑ Create Log files
☑ Internal search within Addon Scenery
● Backup duplicate textures
○ Delete duplicate textures
☐ Keep ReadOnly texture files

e:\fs2004

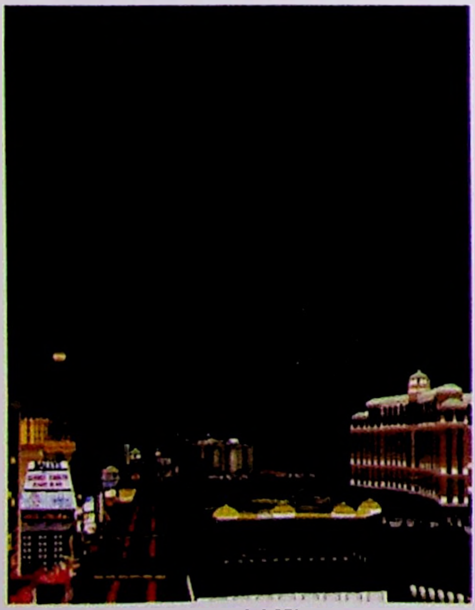
e:\fs2004\Addon Scenery

GERARD DURAND'S FIND ALL DUPLICATE PROGRAM FINDS DUPLICATE TEXTURE FILES.

Viva Las Vegas

Many of us are alert to discovering, downloading, and installing new scenery packages, but here's one I missed – released in the fall of 2003. It's a high quality add-on to the already great default scenery of the Las Vegas "strip." Using Gmax programming, author Shigeo "shige" Ishii added hotels, buildings, trees, and terrain files by referring to a video, a printed tourist guide, and maps that he obtained during a visit to Las Vegas.

After "slewing the strip" southward from the north end to admire the scenery during daytime, go to Time and Season and change the time to 2200 local. You'll see several special effects that are provided by the default scenery: the volcano erupting at the Mirage, the fountain throwing water into the air at the Bellagio, and fireworks bursting southwest of the Mandalay Bay and Luxor hotels.

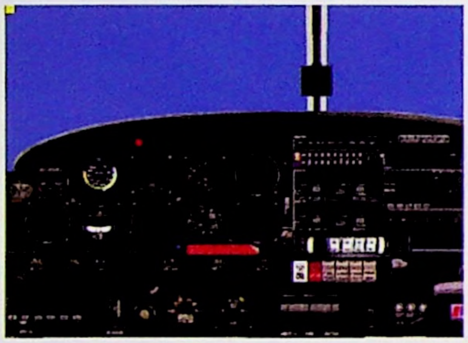


AUTHOR SHIGEO ISHII'S SCENERY ADDS MANY GMAX FEATURES TO LAS VEGAS.

Control Panel Editing

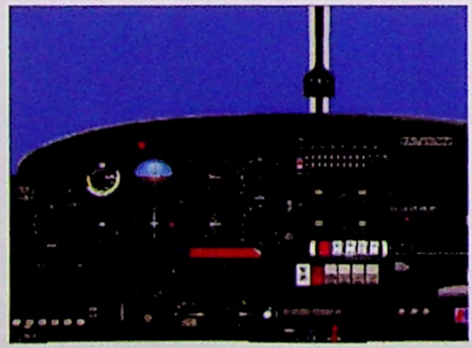
How many times have you seen a new gauge offered, but you've been hesitant to edit the respective panel.cfg file to add the gauge to an aircraft panel? Hesitate no more with freeware or payware solutions by author Ed Struzynski.

Ed's freeware panel editing program is CfgEdit – available at **www.cfgedit.com**. Because it was designed for FS2000, CfgEdit does not fully support editing FS2002 or FS2004 panels, particularly those that include XML gauges. Nevertheless, you can use CfgEdit to modify FS2004 panels, except for XML gauges. Because CfgEdit opens initially with a default location for FS2000, you'll need to use its Options, Preferences setting to point it to your FS2004 folder location. Note the screenshot of my customized Piper Dakota panel, which I've opened in CfgEdit, showing blank locations for several XML-based gauges that do not appear. Note also the blue color above the panel, which is provided by a Test Sky Color option in the program.



PIPER DAKOTA PANEL SHOWING MISSING XML GAUGES.

Ed's payware solution for gauge editing is FS Panel Studio, which is available at http://www.fspanelstudio.com. Note that when opened with this program, all gauges are shown and fully editable on my customized Piper Dakota panel.



PIPER DAKOTA PANEL OPENED IN FS PANEL STUDIO.

Here are the principal features of FS Panel Studio, which I consider to be a great value at $24.99 USD:

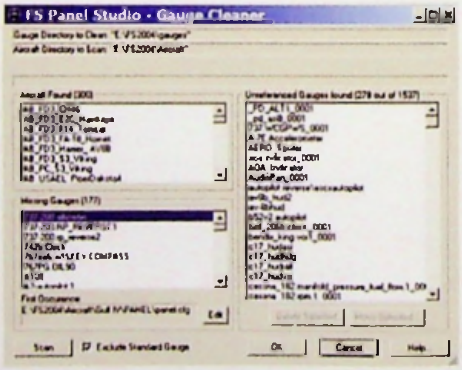
- WYSIWYG – what you see is what you'll get. Panels displayed in FSPS will appear almost exactly like they will in the simulator.

- Edit XML gauges – FSPS can display and edit the internal structure of XML gauges.

- Gauge properties are displayed in an easy to read "tree" format, and you can edit any underlying gauge bitmap. FSPS will extract the gauge bitmap and run your selected paint program, then it will incorporate the changes on your panel.

- After browsing through your gauge collection, you can add, move, resize, modify, or delete a gauge, seeing the changes instantly.

- Gauge cleaner tool - FSPS can display all gauges on your system that are not used on panels. You can then move these gauges to a safe backup location or simply delete them to save disk space. It can also identify gauges used on panels that don't exist on disk. I was surprised to learn that panels for the 300 aircraft in my FS2004 installation are missing 177 gauges, while 278 of the 1537 gauges in my \gauges folder are unused. After these lists are displayed, you can identify which aircraft are missing specific gauges.



THE FSPS GAUGE CLEANER DISPLAYS MISSING AND UNUSED GAUGES.

- You can position gauge windows exactly where you want them, allowing you to overlay radio stacks and GPS radios, for example, to see how they line up.

- You can edit the Virtual Cockpit panel gauges, with some limitations.

- FSPS comes complete with a 120+ page Adobe PDF-format manual. ✈

Subject: Optical Illusions

Congratulations, your magazine is the best. I am a retired flight instructor, CFI, commercial, instrument rated. I fly a P4 Windows XP machine with a 19 inch screen. Now, on to my problem… I was flying about an average of 4 to 5 hrs per session, non stop, IFR, without walking away for a break, and it hit me, an eye strain that first scared me halfway to death, and then, sent me to the emergency room at a nearby hospital. It was diagnosed as a severe optical nerve strain! My symptoms were; everything appeared to be twisted in an angle, like my coffee table twisted to one side. I imagined the worst case, like a brain stroke, but thankfully only an eye strain. Please, take your flying seriously, but remember, take breaks regularly!

"eamontero"
Texas

"eamontero"
WINS 12 MONTH COMPUTER PILOT SUBSCRIPTION/EXTENSION!

[Hi, and thanks for your email and friendly reminder about healthy use of computers. I have in the past warned about taking breaks from the screen, but a reminder is certainly valid every six months or so. If you "go by the book", you should take a 15 minute break away from the screen for every 45 minutes you spend in front of the screen. If that's not possible, for whatever reason, like you are about to enter the arrival area in the next 20 minutes or so, then your best defense against computer-related health issues is to ensure proper ergonomics. The front of your computer screen should be at full arm's reach and no closer. You should be seated so you are looking slightly down at your monitor. If seated for long periods of time, do the same leg exercises as you would do on a commercial flight as a passenger, working your calf muscles and wiggling your toes to keep the blood flowing. Take regular breaks, even for just a few minutes, and be sure to drink plenty of water during the simulated flight. I could go on forever with other tips, but the most important is to be wary of your environment and balance everything out – Ed]

Subject: Sailing in Flight Simulator?

Hi CP… Here's a website worth checking out if you want to add ships to your simulator. Anything from cruise liners to aircraft carriers that you can actually navigate through the mega waters of your simulator. The best models of ships on this site are from the Japanese artist "Hama" - his ships are worth looking at. The website is located at **http://www.fs-shipyards.com**
I have five ships in my simulator and enjoy cruising up canals and the big bays of major cities, up close and personal, like New York, Seattle, Miami, Honolulu, Hong Kong, and others. It's kinda different to take a break from flying and go ocean cruising in the waters of your sim, and the best part is that it's "FREE" - no standing in long lines with your bags, no passport required, no Coast Guard regulations to adhere to, no fuel to buy! Check it out.

Dave Faltermeier
USA

[Dave, thanks for your email and your website suggestion. It is intriguing how our flight simulators have evolved and expanded, even into realms outside of flight itself. The flight sim enthusiast can now download drivable cars, vehicles from popular movies, they can fly on the moon, use jetpacks, sail ships and even simulate skydiving over their favorite drop-zone! Today's flight simulator environment is certainly not just limited to flying circuits in the C172 or tackling difficult approaches in the 737NG. No, we have more choices than ever before, and more add-ons than ever before. It's a wonder anyone has time to actually fly any more! – Ed]

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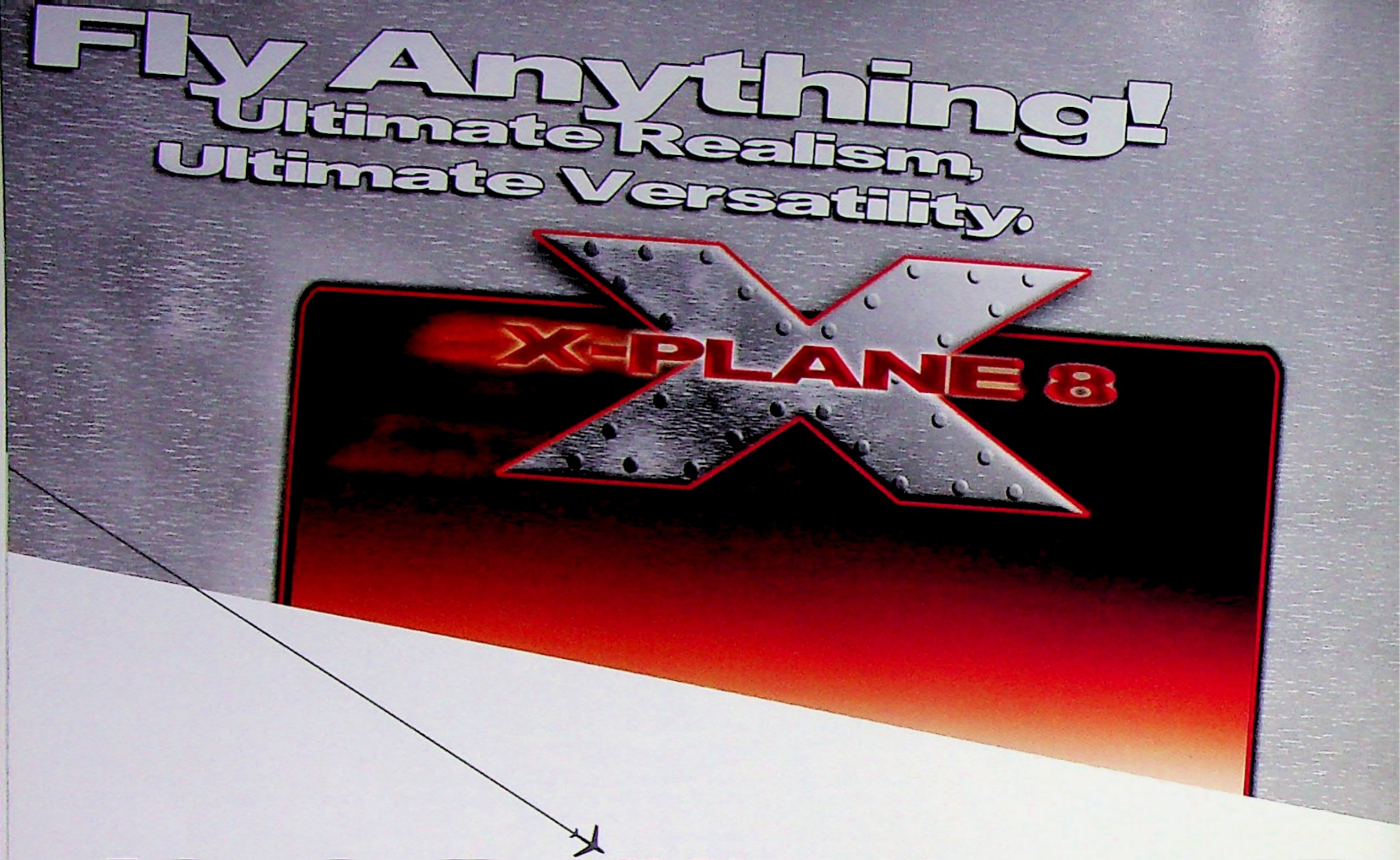
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X-PLANE 8

Enhancing Your X-Plane Models Part III

Custom Instruments

BY CHUCK BODEEN

In spite of the hundreds of different instruments, gauges, buttons, handles, and radios that come with X-Plane, you may want to detail your panel so that it looks more like the real thing. Fortunately, recent releases of X-Plane allow for extreme custom changes to the appearance and operation of any, otherwise default, device. This article is based largely upon X-Plane 8 but most of the instruments and techniques are also available in version 7.

As shown in Figure 1, the default equipment is stored in the **resources/bitmaps/cockpit** folder, organized in sub-folders according to functions. Each sub-folder contains a variety of related devices and X-Plane uses these just as they are unless you override them with custom versions of your own. The "legacy cockpit panels" at the very bottom of the list contains copies of the old "panel_test_linear.png" and "panel_test_nearest.png" files that were used in X-Plane version 7 and are included for forward compatibility. Most graphical files in newer versions of the simulator are of type "png" which stands for "Portable Network Graphics". The older bitmaps "bmp" files can still be used, but png's are smaller, by as much as seven times.

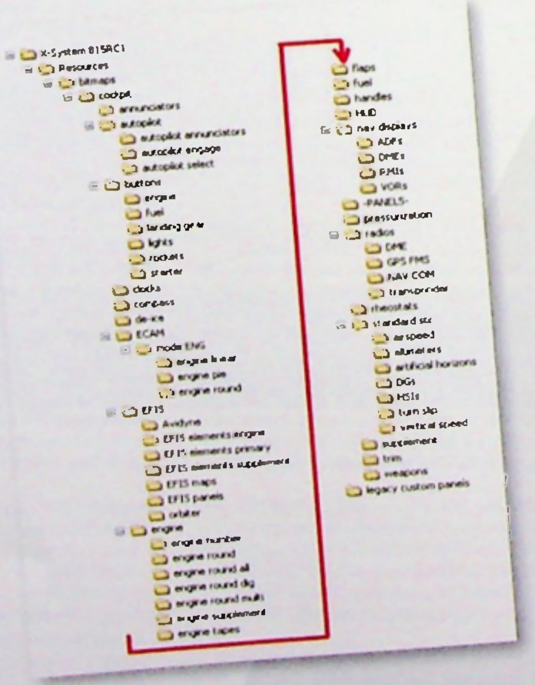


FIG 1. X-PLANE 8.XX DEFAULT INSTRUMENT SUB-FOLDERS

Each new version of the simulator has more instruments with enhanced features, mostly because users and commercial clients of Austin Meyer, author of X-Plane, request them. Still, the man can't make every conceivable device, so he has made it possible for you to tailor your own work, although within limits.

A Simple Example

Using custom instruments requires that you create a small portion of the folder structure within your aircraft folder starting with a **cockpit** folder. Then sub-folders are constructed, but only for the custom instruments you want to create. For instance, if you have a general aviation plane with just a custom panel and an airspeed indicator with a special looking face, you need only a minimal folder structure and a few modified png files.

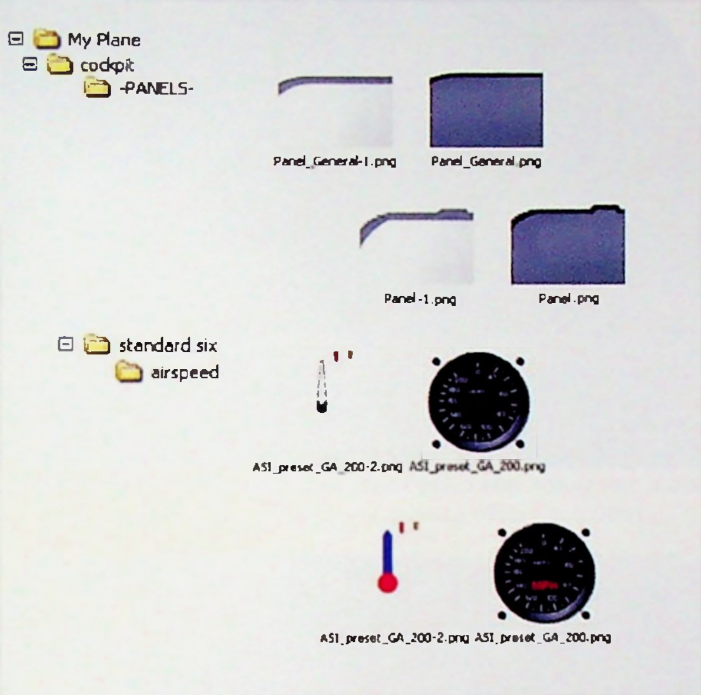


FIG 2. FOLDERS AND FILES NEEDED FOR A SIMPLE CUSTOM PANEL AND ASI

The **cockpit** folder contains all of your custom work. The default items are shown in the center of Figure 2. The panel has two png files: the main one is the actual panel and the "-1" is an optional semi-transparent png that will cast a shadow over the panel and any instruments on it. Similarly, the ASI has two png's: the main one is the face of the instrument and the "-2" file is the needle and a couple of tic marks. The larger red tick is used to mark Vne (the never-exceed speed) on the face and the smaller tic is the autopilot speed setting bug.

The files on the right side of the above image show some simple custom changes. I put a bump in the top of the panel to house, say, a built-in compass and I lowered the left side. If the Panel-1.png is used be sure to modify it as you do with the panel itself. The needle on the ASI has been modified rather drastically, just to make the change clear. The face of that instrument now has the letters MPH added. When you make modification be sure to keep the parts in the same places. The pixel dimensions of the png's can now be rather arbitrary, which means that you may want to enlarge them to add finer detail. If you double the size of the face of instruments, be sure to do the same to the needles. Do not make your graphic files larger than 1024 x 1024 pixels.

Some default instrument faces have just two mounting screws instead of four. If the panel you are modeling uses more screw heads then you can graphically edit as necessary to add more. Similarly, your panel may be of the flush type where no screws are visible, in which case you just erase them.

When the job is finished, the default png's should not be in the **cockpit** folder – only the custom ones. Any devices that you put on the panel that are not in your own **cockpit** folder will be added from the X-Plane default library. Note that while you may start making the panel png with one of the several default ones, the name of your custom panel should be just "panel.png".

More Examples

Jason Chandler has a nice set of planes which you can purchase for very reasonable prices at **http://www.c74.net/xplane**
One of these which has made innovative use of many custom instruments is the 1977 Grumman Gulfstream II, and three of them are examined here in detail.

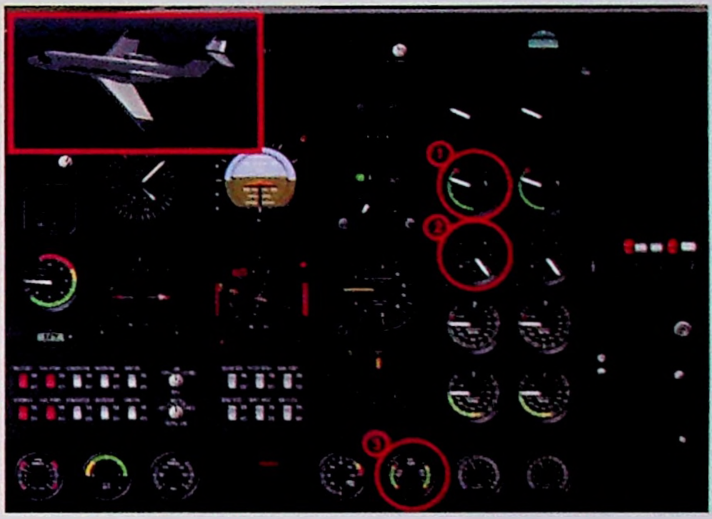


FIG 3. JASON CHANDLER'S GULFSTREAM II PANEL

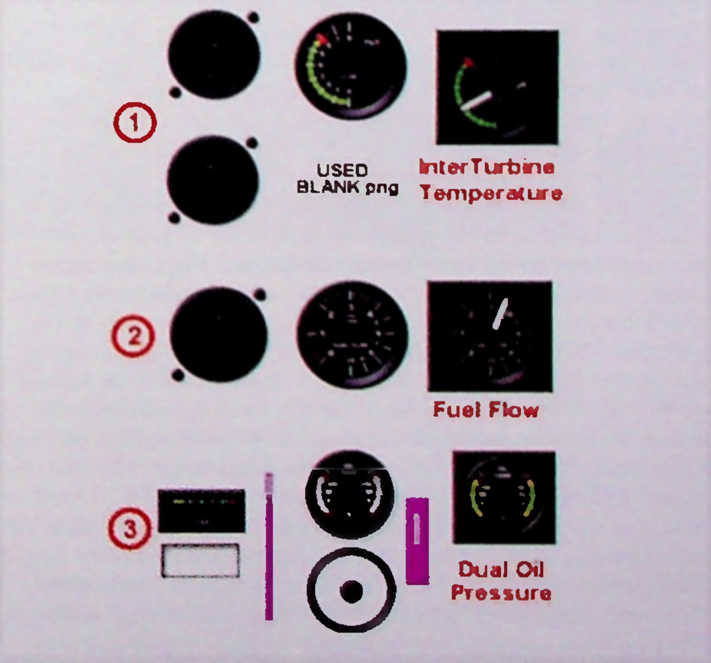
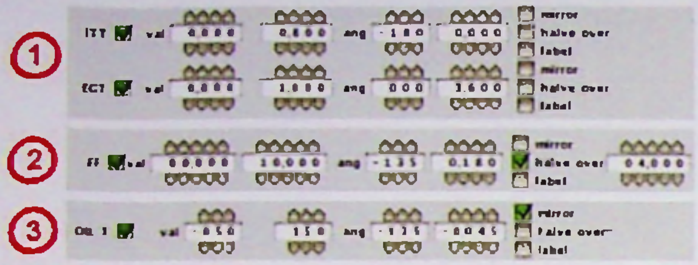


FIG 4. THREE INSTRUMENTS FROM THE GULFSTREAM II

In the Figure 4 the default png files are shown on the left, followed by the modified ones and then by how the gauge looks when X-Plane is running. Figure 5 depicts the settings on the **Standard/Limits** screen. There is more to designing custom instruments than just making the pictures. Setting the limits in Plane-Maker allows you to specify how the needles move on most gauges.


① ITT ☑ val 0.000 0.800 ang -180 0.000 ☐ mirror ☐ halve over ☐ label
EGT ☑ val 0.000 1.000 ang 000 3.600 ☐ mirror ☐ halve over ☐ label

② FF ☑ val 00.000 10.000 ang -135 0.180 ☐ mirror ☑ halve over 04.000 ☐ label

③ Oil T ☑ val -050 150 ang -135 -0045 ☑ mirror ☐ halve over ☐ label

FIG 5. "LIMITS" SETTINGS FOR THE THREE GULFSTREAM GAUGES

Numbers and a colored arc (Figure 4) were added to the InterTurbine Temperature png. The limits (Figure 5) for the needle movement were set so that temperature ranges from zero degrees at minus 180 degrees of arc (which is measured clockwise from the top of gauges) to 800 degrees at the top – zero degrees of arc. A small Exhaust Gas Temperature (EGT) indicator has been overlaid on the face of the ITT instrument. Some gauges like N1 and N2 both have small "tenths" dials which are overlaid to make reading more accurate. No such files exist for ITT so the scaled EGT, which is similar in behavior to ITT, was used instead. If you look closely you will see that the limits have been set so that zero EGT is at the top and 1,000 degrees EGT is at an arc of 3,600 degrees. This means that the dial will turn through 10 circles over the complete temperature range and the reason for this large scale factor is that the EGT is being used as a substitute for "ITT_tenths". One complete turn of the EGT represents a change of 100 degrees on the ITT dial.

The Fuel Flow instrument makes use of a very interesting feature: the "halve over". Zero fuel flow is with the needle at -135 degrees and 10,000 lb/hr is at 180 degrees. But above 4,000 lb/hr the scale factor is cut in half – i.e. "over 4,000 lb/hr cut the scale in half". The needle moves through 135 degrees from zero to 3,000 lb/hr but from 4,000 to 7,000 lb/hr it moves through only half that angle or 67.5 degrees. The corresponding numbers and tic marks were added by hand graphical editing.

The dual oil pressure gauge utilizes a couple of interesting tricks. Chandler wanted to have a gauge with an overlaid "-3.png" to limit the visibility of the needles. There are no "-3.png" files in the **engine round** folder, but there are such files in the **engine supplement** folder which contains the square instruments. On the **Limits** screen Oil T is set so that -50 psi is at -135 arc degrees and +150 psi is at -45 degrees, essentially tipping the gauge on its side. That takes care of the left side of the gauge. Now here's the other trick. By checking **mirror** on the **Limits** screen and placing another gauge directly over the first, X-Plane automatically creates a mirror image of the gauge on the same face. Again, the tic marks, numbers, and colored arcs were added by hand. Note also that the needle png was modified from that appropriate to the wide swinging square instrument to one better suited for a round face. There is also a txt file associated with needle gauges that reflects the distance from the gauge center to the center of rotation of the needle. In this case it was changed from the default -52 pixels to zero so that the needles rotate about the center of the gauge face.

Jim McNeill and Shannon Boatman (aka Shade Tree Micro Aviation) have produced several very nice planes available for a small fee at **http://www.x-plane.org/home/papamac/index.htm**

The specialty of the house is a collection of planes that Jim has flown over a long career. The latest is a model of the Cessna TR182 RG that he owns and flies.

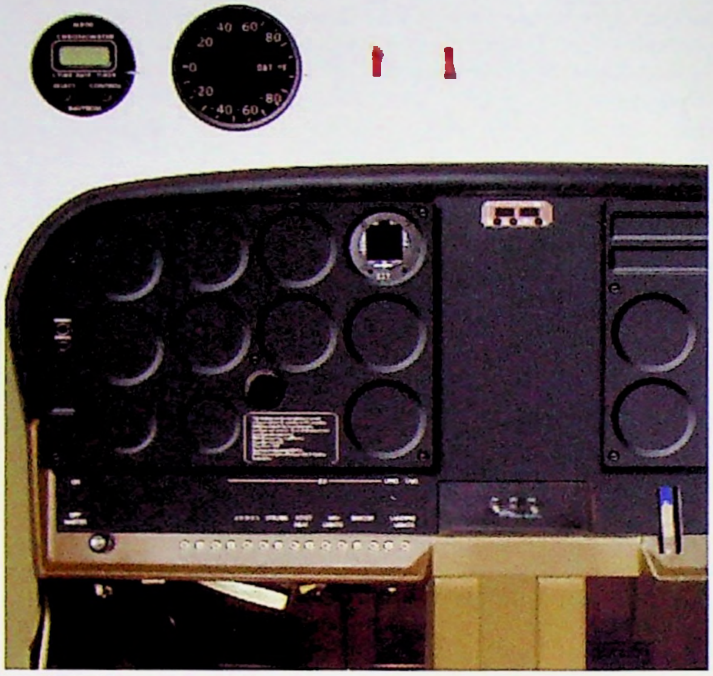


FIG 6. THE SHADE TREE C-182 PANEL AND SOME OF THE CUSTOM WORK

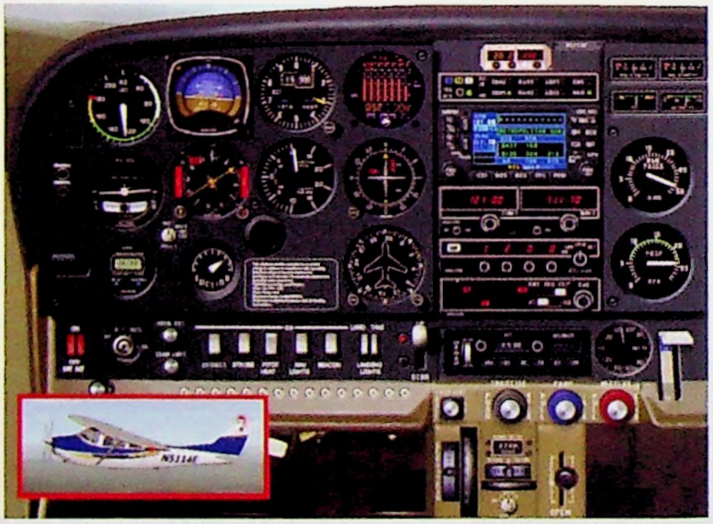


FIG 7. THE C-182 RG SHOWING FULL PANEL DETAILS

Graphic Programs

There are many graphics programs available and here are just a few:

Program	Source	Cost $US
MS Paint	Comes with Windows	free
ImageForge	www.cursorarts.com	$29
PaintShop	www.corel.com	$89
PhotoShop	www.adobe.com	$599

According to the old adage "you get what you pay for", these are listed in order of capability. All four will save files in a variety of formats, but the higher you go on the scale the more choices you have. Suffice it to say that all will handle bmp, jpg, and png. I use ImageForge most of the time and PaintShop when I need to make semi-transparent windows for airplanes or shadows for the "-1.png" files. The three professional programs each have free time-limited trial versions. While Photoshop is one of the most popular, I have not had much experience with it since I do not intend to buy it.

Fonts

You may want to do some of your own lettering on custom panels or instrument faces. As you might expect, the more pixels you use to define them the easier they are to read. In Figure 8 is an enlarged view of fonts of different sizes. The right top shows how they look in Plane-Maker sized at .75, 1.0, 1.5, and 2.0. The view in X-Plane is below that. I usually use letters five pixels high for most work.

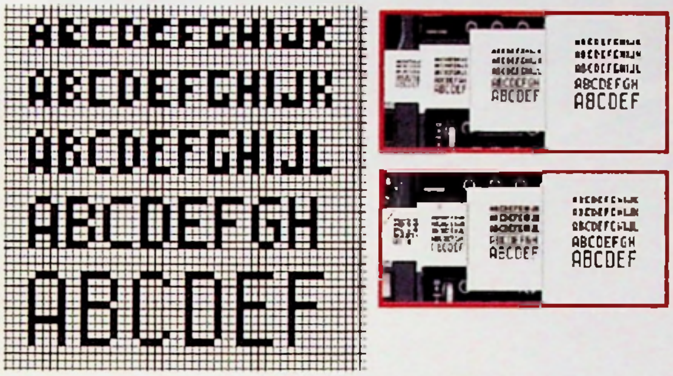


FIG 8. FONTS BASED UPON 4, 5, 6, 7 AND 9 PIXELS IN HEIGHT

Fancy Use of Legacy Files

Sean Tabor does an excellent job of painting panels with custom instrument faces directly on the panel. You can download his imaginative planes for free at **http://www.xplanefreeware.net/~sean/aerospace/acf7/**

As shown in Figure 9, Tabor uses the "Legacy" technique from older versions of X-Plane which involves pasting "OFF" images of buttons and handles on the picture of the panel and then modifying the "test_linear" and "test_nearest" bitmaps to show the "ON" positions. If you look closely at the other examples in this article you will notice that the off and on positions are shown in two different parts of a single png file and that there are sets of png files for every button or handle that you put in your **cockpit** folder. We are fortunate that Austin Meyer has carried the Legacy method forward so that planes constructed in earlier X-Plane versions still work.

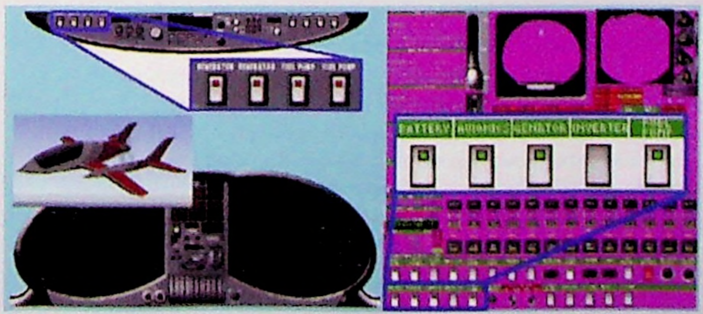


FIG 9. PANEL AND TEST_NEAREST FILES FROM SEAN TEBOR'S "AROS" PLANE

Little Butch

Recently I had the opportunity to fly a small aerobatic plane for an hour. The Monocoupe 110 SP Clip Wing is also known as the Little Butch. Richard Smith, the owner of the plane, had sent me photographs of the panel and identified all of the instruments so that I could practice at home before the real event.

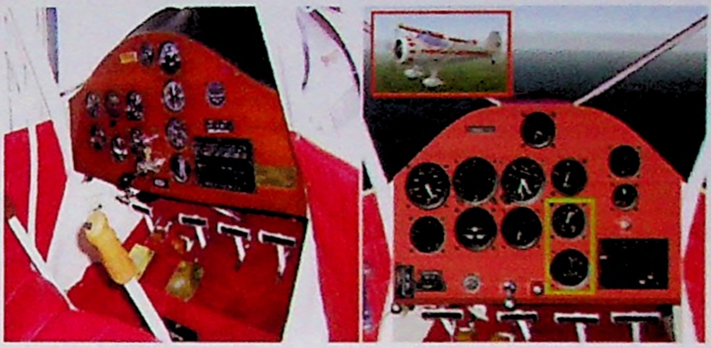


FIG 11. PHOTO OF THE BUTCH PANEL AND THE X-PLANE VERSION

The instruments in the green box in Figure 11 are the best examples of custom work. The one on top is actually three gauges in one. The main instrument is oil temperature and the two lower ones are oil pressure and fuel pressure. I built the Butch model for X-Plane 7.63 which has no fuel pressure gauge, so I substituted fuel flow instead. There is a fuel pressure instrument in X-Plane 8.xx.

The lower instrument measures two cylinder head temperatures and is quite a bit like Jason Chandler's oil pressure device in Figure 4. However, the "mirror" technique for multiple gauges in the same instrument face only works if the two share the same center. The opposing CHT gauges on the real Butch had to be modeled as two that are separated vertically.

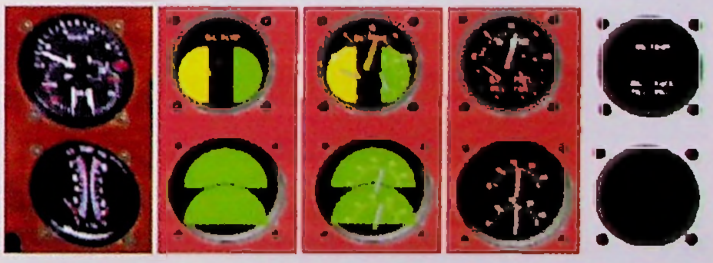


FIG 12. THE COMPOUND GAUGES ON THE LITTLE BUTCH

Figure 12 shows, left to right, the real gauges, as shown in Plane-Maker, a quick look in X-Plane, the final version in X-Plane, and the modified instrument face png files. The png files for the smaller instruments were temporarily set to colored semicircles so that they could be located in Plane-Maker over the instrument faces and checked in X-Plane. When everything looked good, the pngs were changed to be all transparent.

You now have at least an introduction to some of the methods used to customize your instrument panels. Go to it and have fun.

You can reach Chuck Bodeen at **bodeen@gmail.com** ✈

D.I.Y. PANEL BUILDING Part II

WITH PETER STARK

Welcome back to the second part of this Panel creation tutorial series. Last month, we examined the basic components that go into making a panel in FS2004 and some of the important sections in the panel configuration file. This month we are going to modify an existing panel so that you become familiar with just how some of these sections affect the appearance and functionality of the panel to improve your flight simming experience.

Rule No.1

Make a backup of ANY file you are attempting to modify and put in a safe place away from your FS2004 folder! I usually create a FS Backup folder in the My Documents folder and keep my originals there in case I need them later. It is far too simple to make an incorrect key stroke that renders part of your configuration file useless. You have been warned!

Text Editors

We don't need any complex or expensive software to open and edit FS2004 configuration files. I use the Notepad text editor that comes with Windows, and it is perfectly adequate for our purposes. If you already use another text editor - that's just fine as any ASCII text editor will do the job.

Refreshing Our Panel

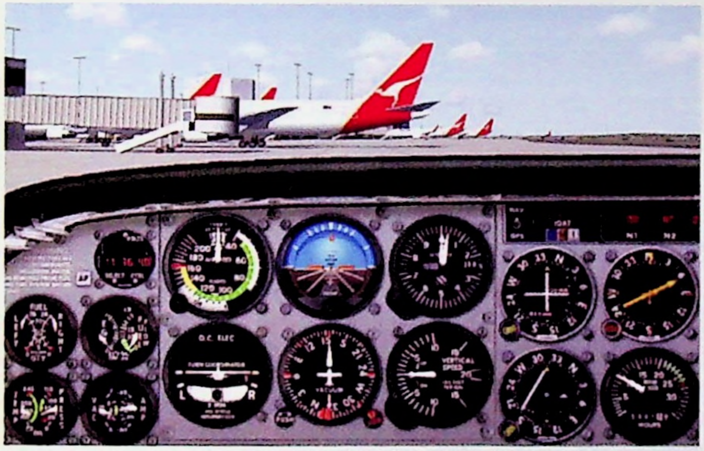
Unlike scenery files, you don't need to restart FS2004 every time you wish to examine your work in progress. There are two useful ways to do this. Firstly, go to Options > Controls > Assignments. Scroll down the list and highlight 'Reload User Aircraft'. Click 'Change Assignment' and enter a keyboard command that isn't used in FS2004. I use Ctrl + F11. Click OK to return to the cockpit. Now you can refresh the panel by reloading the aircraft using this command when you wish to examine your changes to the panel. If the panel won't refresh using this command, all you have to do is reload the plane using the Aircraft > Select Aircraft menu. Just select another paint scheme of the same airplane and your modified panel will load.

[VIEWS]

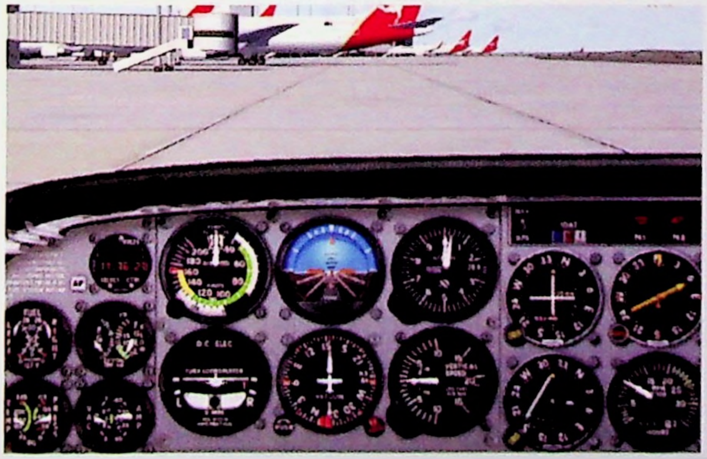
One area we visited briefly last month was the Views section of the panel.cfg file. In this section we can alter the view we get out of the cockpit by lowering or, more usually, raising the seat to give a satisfactory view of the surrounds. Let's look at exactly how we can use this section to improve our visibility, particularly during taxiing and landing.

Open the main FS2004 folder and navigate you way to the Aircraft > C172 > Panel folder and make a backup of the panel.cfg file and store it elsewhere as discussed above. Double-click the panel.cfg file and when Notepad opens, scroll down to the [Views] section:

```
[Views]
VIEW_FORWARD_DIR= 3.0, 0.0, 0.0
```



THE DEFAULT C172 FORWARD VIEW



THE VIEW HEIGHT RAISED FOR IMPROVED VISBILITY

The value of 3.0 is telling FS2004 that the eye-point level in the forward direction is 3.0 units high. The first value of 0.0 tells the sim that the view has no tilt. (It is possible to tilt the view up or down - such as when you are creating a cockpit view for a taildragger.) The second value of 0.0 tells FS2004 that the view out this window is zero degrees relative, e.g. you may change this value to say -45 or 45 when setting up forward-left and forward-right views respectively.

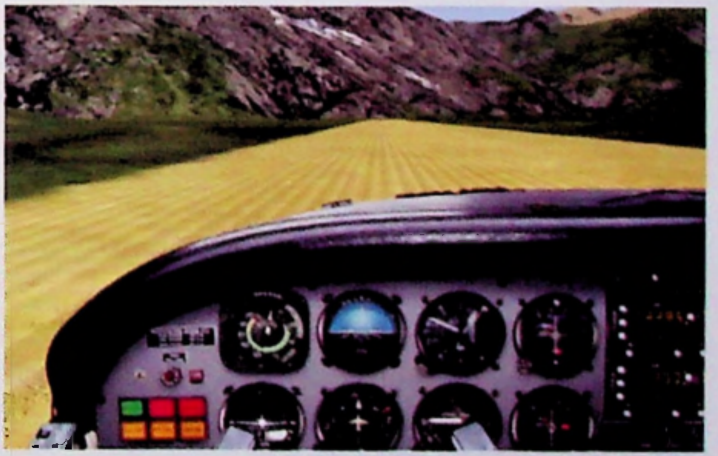
In this simple case, let's improve the visibility in the forward view by raising the seat, or increasing the first value from 3.0 to 5.0. Then save your panel.cfg file and refresh your panel in FS2004. You can see how the forward visibility is now much better. In reality, the C172 forward view is quite good, but there are many aircraft where this simple modification will enhance your flight simming enjoyment.

If the aircraft panel you are modifying also has other views (forward-left and right, rear etc.) you can alter them using exactly the same method.

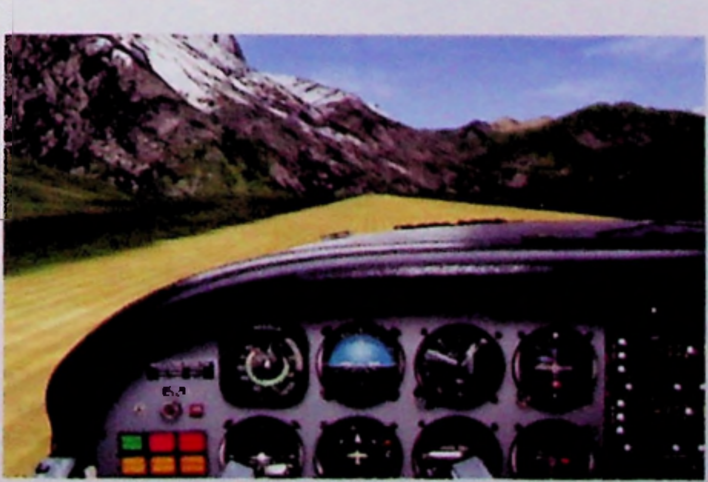
Another useful tool in the Views section is the ability to change the zoom factor for any window. The default zoom setting for the forward view is 1.0. Now I don't know about you, but I find that zoom factor too restricting. It is almost like looking through a tube and you don't get the effect of peripheral vision that you do when in a real aircraft. This makes a real difference whilst taxiing, and during takeoff and landing. I have found that a zoom factor of 0.82 looks about right for me. You could of course alter the zoom factors after you have loaded the aircraft using the '+' and '-' keys but the effects are temporary. It is very simple to make them permanent by adding the following line to the Views section.

```
VIEW_FORWARD_ZOOM=0.82
```

Any zoom factor can be applied to any view from the cockpit by changing the 'FORWARD' part of the command to 'FORWARD_RIGHT' or 'REAR' etc. and inserting an appropriate value.



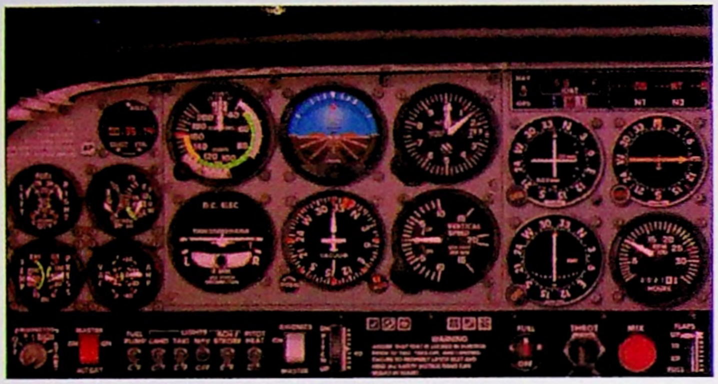
NORMAL ZOOM FACTOR



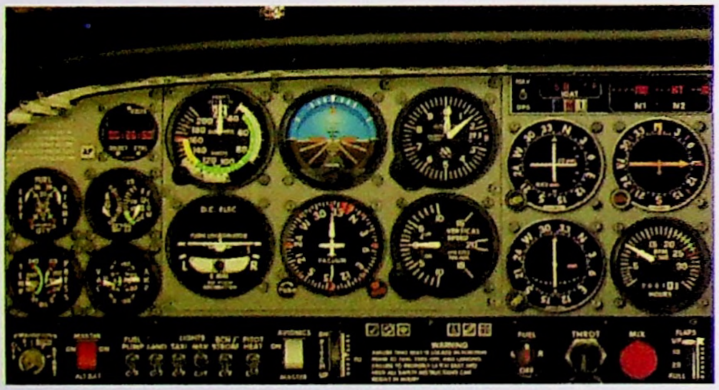
MODIFIED ZOOM FACTOR OF 0.82

[COLOR]

This section determines the color of the light that illuminates the cockpit. The daylight value of 255, 255, 255 means 255 units each of red, green and blue - which means white light. The familiar red panel illumination we see at night is determined by the values of 233,108,107. We can change this if we wish by opening the Paint program that comes bundled with Windows (or most commercial image editing software) and using the color pallette to choose your preferred shade. You then simply record the RGB values which will be displayed under the red, green and blue boxes in Paint and replace the default RGB values in this section of your panel.cfg file. The RGB values for my example below were 204,199,106. Now return to FS2004, reload your plane at night and switch on your battery switch and nav lights. Note the change in your panel illumination color!



NORMAL RED NIGHT LIGHTING



ALTERNATIVE NIGHT LIGHTING

[WINDOW00]

This section is really the core of where we will work for the remainder of this series. We explained the meanings of the opening lines in last month's tutorial, so let's move on to the "Gaugexx=" commands. You may recall that FS2004 sees a switch in exactly the same way as an instrument. They are all gauges and so all can be modified or included in a panel using the same command syntax.

Let's look at the first gauge in the C172 panel.cfg file:

```
gauge00=Cessna!ADF,545,86
```

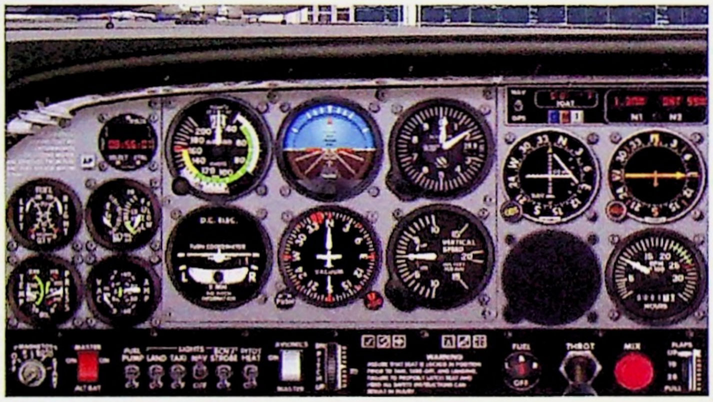
"Gauge00" is simply a sequential numbering system to tell FS2004 that the following commands are talking about a new gauge line. The "Cessna!" command tells FS2004 to look in the "Cessna" gauge file (Cessna.gau) in the Gauges folder. "ADF" is telling FS2004 to refer to the ADF gauge within that gauge file. The 545 tells the sim that the gauge will start at 545 millimeters from the left hand edge of the window. The 86 tells the sim that the top left hand corner of the gauge starts 86 millimeters down from the top edge of the window.

Note that in many configuration files there will be another 2 integers, e.g.

```
gauge00=Cessna!ADF,545 86,90,90
```

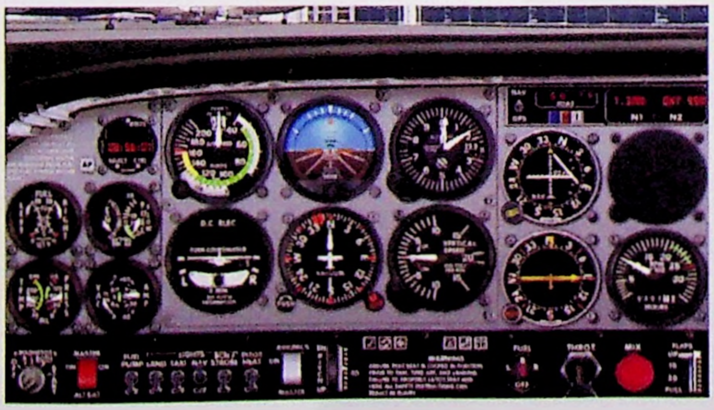
They refer to the actual gauge size in millimeters. In this example the gauge will be 90 millimeters wide and 90 millimeters high. When you start to make a custom panel yourself (next month's tutorial), you will be adjusting the size of the gauges to make the panel look proportional, so we will be using these extra two numbers.

To become more familiar with this section, let's firstly look at how we can remove a gauge we don't want in our panel. I haven't flown many C172's that have two VOR navigation aid instruments. Let's remove the VOR2 gauge that is Gauge37 in the C172 panel.cfg file. Simply delete that line from the file and resave it. There is no need to renumber the remaining gauges. Reload the panel and we can see a blank area where the VOR2 gauge used to be.



THE VOR2 GAUGE REMOVED

Now let's take at look at how to move a gauge. We will move our ADF gauge by changing the default 'x' and 'y' values of the Gauge00 line. Change the 545 and 86 values to 452 and 181 and save the configuration file. Return to your panel in FS2004 and refresh the aircraft/panel. Your ADF has now moved to position where the VOR 2 was and there is now a blank area where the ADF used to be. I obtained the new 'x' and 'y' values from the Gauge37 line before I deleted it.



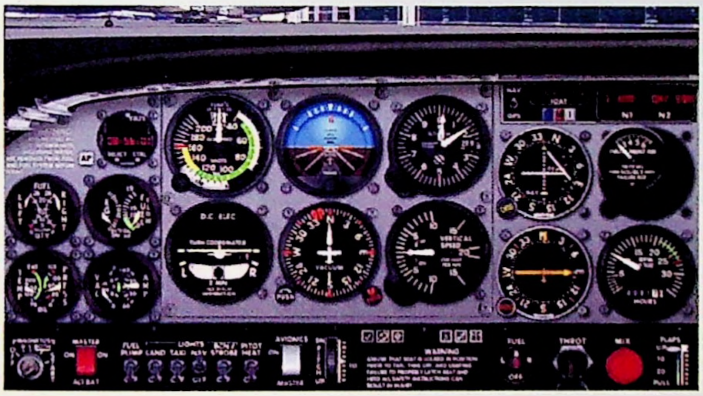
REPOSITIONED ADF GAUGE

Now let's look at how to add a whole new gauge to this panel. If you load the default Beechcraft Baron you will see a gauge called 'Instrument Air' on the top left section of the panel. This gauge provides information to the pilot about the status of a vacuum to the instruments that keep the gyros turning. Naturally, an IFR pilot would like to know when his artificial horizon and directional gyro are failing and this instrument can give him this warning. So we will add it to the default C172 panel in the blank position where the ADF was originally positioned.

The easiest way to discover what gauge name FS2004 uses to load this instrument is to look at the default Beechcraft Baron panel.cfg file. You will see that gauge08 refers to the 'Beech_Baron!Instrument Air' gauge. Return to the C172 panel.cfg file. We removed Gauge37 (the VOR2 gauge) earlier, so let's use this number to position our new instrument. Our command should be:

```
gauge37=Beech_Baron!Instrument Air,545,86
```

where 545,86 'x' and 'y' values were taken from the original ADF gauge position. Refresh your panel and look at the newly installed gauge.

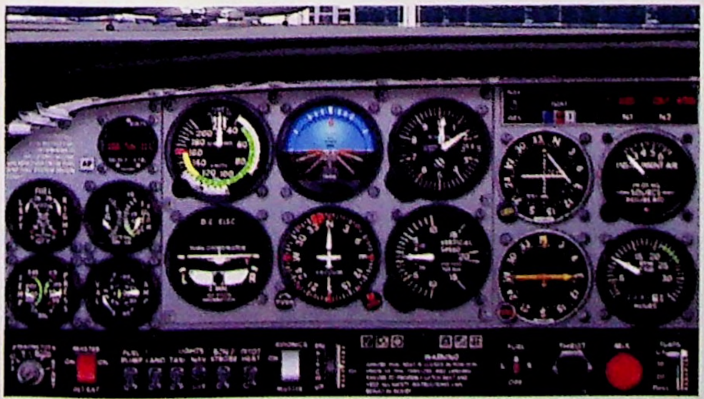


A NEW GAUGE ADDED TO OUR PANEL, BUT IT STILL NEEDS WORK!

Have you noticed how the Instrument Air gauge doesn't quite fit into the blank area on the panel? Let's now change the size of the Instrument Air gauge to fit perfectly. Alter the gauge 37 line to:

```
gauge37=Beech_Baron!Intrument Air,547,88.88,88
```

We have repositioned the gauge and increased its height and width to fill the blank position in the panel. Now resave your configuration file and reload the panel. Well done - perfection!



OUR MODIFIED PANEL IS COMPLETE

Sub-Panels

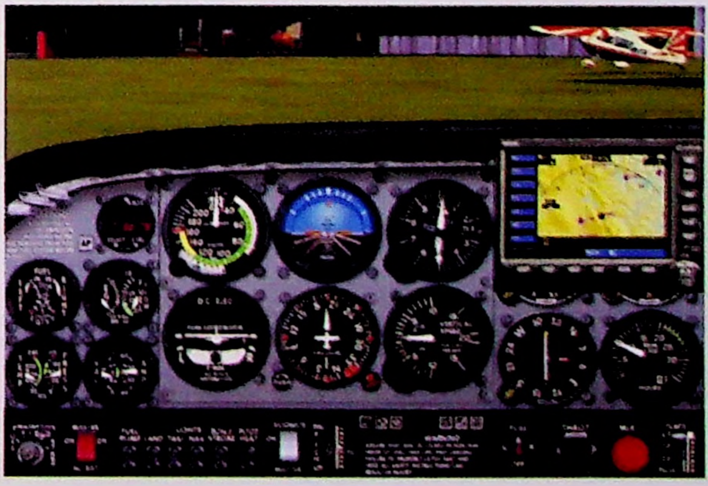
So far we have referred to sub-panels only briefly. Now that you have the skills to modify the main panel, let's take a look at a common sub-panel, the GPS gauge. The C172 panel.cfg file tells us that the GPS gauge has been allocated Window02. If we scroll down the configuration file, we can see the following:

```
[Window02]
size_mm=456,378
window_size=0.5
position=8
BACKGROUND_COLOR=0,0,0
VISIBLE=0
ident=GPS_PANEL

gauge00=fs9gps!gps_500,          0,0
```

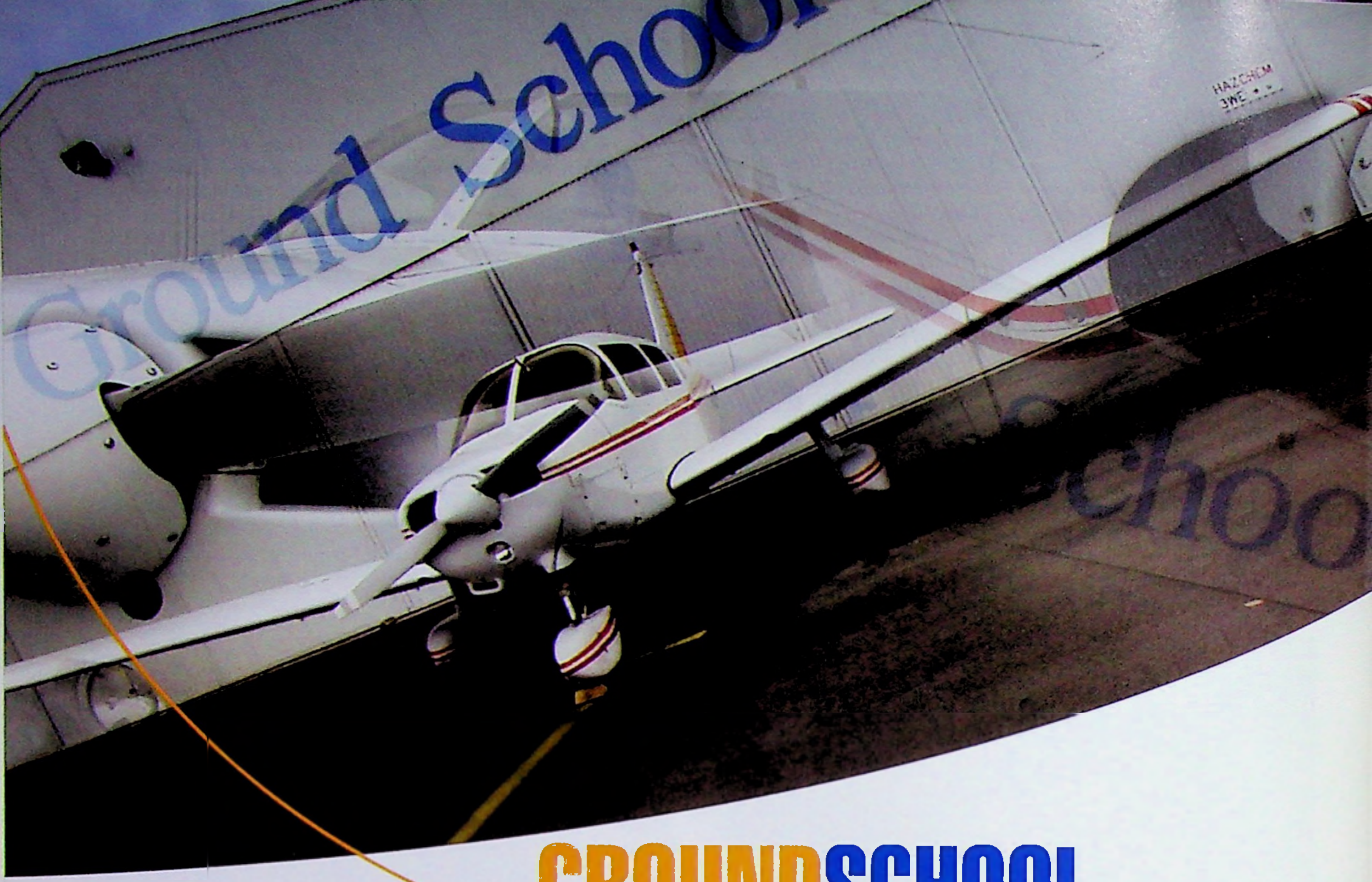
Your experience gained from this series should be able to tell you that this window is just 456x378mm in size (remember a full panel is usually 1024x768mm) and that when opened it will display in position 8, i.e. the bottom right hand corner of the main panel window. Window_size=0.5 is another command that scales the size of the window that opens. The background color is 0,0,0 which means transparent in FS2004. This is so that when the GPS is not being displayed, you see the main panel in that position. The VISIBLE=0 line tells us that the GPS is NOT visible when the main panel is initially loaded. Ident=GPS_PANEL informs FS2004 that this sub-panel correlates to Window02 in the Window Titles section.

To gain some experience in a sub-panel, let's move the GPS display position from the bottom right corner to the middle right side of the panel and slightly reduce the size of it so it appears like a permanent part of the panel. Simply change the line position number from 8 to 2 and the window_size value to 0.3. Now save the configuration file. Reload your panel/aircraft and open the panel as usual. Presto! It will now appears in the new position and size.



THE REPOSITIONED GPS

That's it for this month - I hope you are inspired to start customizing your existing panels. If you want more details on panel configuration file structure, I recommend you download the Microsoft FS2004 Panel and Gauges Software Development Kit from **http://www.microsoft.com/games/flightsimulator/fs2004_downloads_sdk.asp** as next time we will put all this knowledge together to create our very own panel! ✈



GROUNDSCHOOL...

Skill Level: **All Levels** Instructor...**Ben Ippolito**

Checklists

This month we will have a look at something that every pilot has a dislike for... checklists. However, without them we would be in real trouble! There are many simple things that, in the heat of the moment, can be forgotten when something else is happening which can lead to embarrassing results, or worse. We take a look at the very basic checklists that I use in my own day-to-day flying in light aircraft, right up to the extremely complex checklists that are used in modern airliners.

Why do we have checklists?

A common question from student pilots is "why do we have checklists at all?"

"I have a good memory, I don't forget things!" As they will soon discover, flying an aircraft takes more concentration than driving a car. Because there are more mental resources devoted to the task at hand, there is less 'reserve capacity' to handle other tasks. When we are doing something we are not familiar with (like flying for the first time, handling an abnormal procedure on the aircraft, or flying to a new destination for the first time) then we need even more resources than normal, and therefore have even less reserve than normal.

What does this mean? It means that, quite simply, we are liable to forget things, even simple things that you would rate on the 'brain-fade scale' normally. Why do you think that we have so many gear up incidents each year? Everyone (even non-pilots) know you have to put the gear down before you land, however, some pilots get distracted, forget, don't run a checklist and get thoroughly embarrassed when they hear a grinding noise when they touchdown. It's not confined to low-hour pilots either, there have been very experienced Chief Flying Instructors that have landed a perfectly good aircraft with the gear still firmly up! However, if they had run the checklist it would have called for the gear at some point to be checked 'down and locked, 3 greens'.

The 'One checklist suits all' Checklist

When I was in my initial training I was obviously taught checklists to use in the aircraft. These I learnt off by heart and I have used ever since. What struck me however was that when I transitioned to a new type (from the Cessna 150 to a Piper Cherokee Warrior) I was told to use exactly the same checklists. Now anyone who is familiar with these aircraft will know that outside of speeds, and the addition of the fuel pump, not much changed. Flying Schools teach these 'generic checklists' so to simplify the job for the student, as most training aircraft have nearly identical systems. It's only when you get on to more serious high speed singles and advanced twins that you must start using the actual checklists.

The generic checklist avoids having the student learn the actual manufacturer's checklist for each aircraft type they fly, as this may lead them in a time of high mental demand to use the wrong checklist for the wrong aircraft, as many trainers do not have the printed checklists in an easily accessible area when in flight. These generic checklists have survived use in the many aircraft types that I have flown, from Cessna 150's and Piper Tomahawks to the much larger Piper Seminole and Partenavia 68. It's a simple matter of learning the full menu and then removing items that aren't applicable to the aircraft you are flying.

"ONE AIRCRAFT THAT YOU CAN USE THE GENERIC CHECKLIST FOR IS THE PIPER ARROW II THAT I FLEW FOR MY COMMERCIAL PILOT'S LICENCE TRAINING. THIS WAS A SNAP TAKEN BY A FRIEND AS I TAXIED IN AFTER ARRIVING AT A REGIONAL AIR SHOW. YOURS TRULY AT THE HELM IN THE LEFT HAND SEAT, WHILE MY 'MEDIA PERSONNEL' IS ALREADY ROLLING FILM FROM THE RIGHT SEAT."

Let's take a look more closely at the generic checklist. For many of the quality add-ons now available for our sims, you can actually follow along the checklist and perform many of the requirements in your sim.

Before Start

Master Sw	ON
Magnetos	BOTH
Primer	Engine Primed if required (engine specific way of priming)
Fuel	FULL RICH or IDLE/CUT-OFF, depending on engine type
Area	CLEAR
Start Clearance	Gained if required
Announce	"CLEAR PROP"
Starter	ENGAGE

After Start

Mnemonic: ROVAR

RPM	1000 RPM (suitable for most piston aircraft)
Oil Pressure	RISING WITHIN 30SEC
Vacuum	4-6" (While these may vary, a positive indication is okay, since it probably won't be 'in the green' while at this low RPM)
Ammeter	Positive Charge Indicated
Rotating Beacon/Radio	ON

Taxi Checks

Clearance	Received if required, announce intentions if at uncontrolled airfield
Brakes	Release Park Brake, check brakes shortly after moving off
Instruments	Check Compass, DG, AH, and Turn Coordinator are responding correctly in turns. Check both left and right turns

Run-ups

(actions repeated in twin engine aircraft for other engine; however RPM is increased/decreased at the same time… better for the airframe and the pax)

RPM	Increase to CSU check value (type specific) (Approx 1800RPM)
Prop Pitch	Cycle (no more than 400RPM drop) 3 times if cold, twice if warm
RPM	Set Mag Check value (Type specific) (Approx 2000RPM)
Mags	Check Right and then Left Mag (Normally 150RPM drop max, 75RPM difference max)
Feather Check	Twins only, check prop feathering, no more than 600RPM drop.
Carby Heat	Check ON for 10sec, ensure no RPM rise/rough running, if so this indicates the presence of carby ice, and carby heat should be applied until there is no more rough running or RPM rise, and then +30 sec. If carby ice is detected ensure you check again immediately before takeoff no more ice has formed
Idle Check	Reduce engine(s) to idle, note normal idle RPM, and smooth running.
RPM	Back to 1000RPM

Before Takeoff

Mnemonic: TMPFISCH

Throttle Friction	SET (In the real aircraft there are levers or wheels to adjust the friction of the throttle quadrant, this stops the engine controls moving of their own accord due to the vibration of the aircraft
Trims	Set for Takeoff (All available trims should be set to the takeoff position marked on the trim indicator)
Master Sw	ON, ensure that both the BATT and ALT sides are on!
Mags Sw	BOTH, to check you haven't left only one mag on after run-ups
Mixture	Set FULL RICH (Some operators leave this for the line-up checks as some aircraft are prone to s park plug fouling if the mixture is full rich for too long at low power settings)
Primer	IN and LOCKED if fitted
Fuel	ON, tanks configured for departure. QUANTITY SUFFICIENT for the flight that is planned and VISUALLY VERIFIED (on the walk around)
Flap	CHECKED (run it full down, at walk around and then back up here), then SET FOR TAKEOFF (for most aircraft that is up, but it is type specific)
Instruments	CHECKED (physically check that each

	instrument looks ok, no warning flags in view), DG SET (ensure DG matches compass heading, use the 'D' key in FS), QNH/ALTIMETER xxxx/ xx.xx SET (say the value and point to the setting on the altimeter to confirm it's correct, use the 'B' key in FS)
Switches	Check that avionics that are required are on, transponder on STBY and warming up, lights set as required, and also check the circuit breaker panel to see that all breakers are in and none have 'popped'
Controls	FULL & FREE MOVEMENT IN CORRECT SENSE. Check controls in every direction and visually check that the controls move in the correct direction for the control wheel movement. (It's not possible all the time in the real world. In Cherokee's the stabilator is hard to see from the left seat! Also, the Piper rudders aren't able to be moved on the ground, because they are directly linked to the nose wheel steering, unlike the Cessna's. But in FS you can 'cheat' and use the spot view, or the virtual cockpit if your aircraft has one Hatches/Harnesses – Check that all doors and windows are closed, and everyone has their seatbelt fastened 'low and tight across their lap', don't forget shoulder harnesses for those up the front. With all the windows closed now is also a good time to double check that the ventilation system is set up correctly

It's not in the mnemonic but....

Takeoff briefing – COMPLETE, not the "full-on" one that the jet drivers use, but a simple recap of engine failure procedures and glide speeds for singles, and a recap of engine out procedures for twins, including a review of decision speeds and after takeoff actions including route if you're in a high terrain area. Light twins don't go too well with only one engine.

Line Up

No mnemonic, but a final look over the panel to make sure that everything is set.

Mixture	FULL RICH
Pitch	FULL FINE
Transponder	MODE C (Correct code set)
Strobes	ON ENTERING RUNWAY (if fitted).
Fuel Pump	ON if required (type specific)

After Takeoff

Normally type specific, but include:

Flap	UP
Fuel Pump	OFF (if used)
Gear	UP, LIGHTS OUT (most aircraft indicate gear up by having all lights out, if there is a light on it is still possible that there is a wheel or wheels that aren't fully retracted which will limit your top speed until it does retract fully

Then with the exception of navigation checklists we are checklist free until we re-enter the circuit area, or are cleared for a straight-in approach when we would run the before landing checks. Don't call them downwind checks because you might forget them when you have a straight-in approach!

Before Landing

Mnemonic: BUMFTH

If you have a retractable gear aircraft, it's a good idea to select gear down as the first item, that way by the time you get to "U" the gear should be down (or almost).

Brakes	Check for pedal pressure (in case something happened to the lines in-flight), this will alert you to a brake problem before it can become an issue. Also check that the park brake is off, as this will cause a big problem otherwise
Undercarriage	Check gear down, and sufficient green lights (some have one, others have one for each leg). For those without RG, then the famed response is 'Down and Welded'
Mags/Masters	Should be BOTH and ON respectively unless you have something wrong with the ship
Mixture	FULL RICH, in-case of a go-around
Fuel	Tanks configured for landing, boost pump on if required
Temps/Press. (Oil)	Final check of engine health… more important when you are flying circuits to monitor the engine
Hatches/Harnesses	Finally ensure that all doors and windows are closed and locked (as you sometimes have them open in flight) and again all seatbelts are fastened correctly

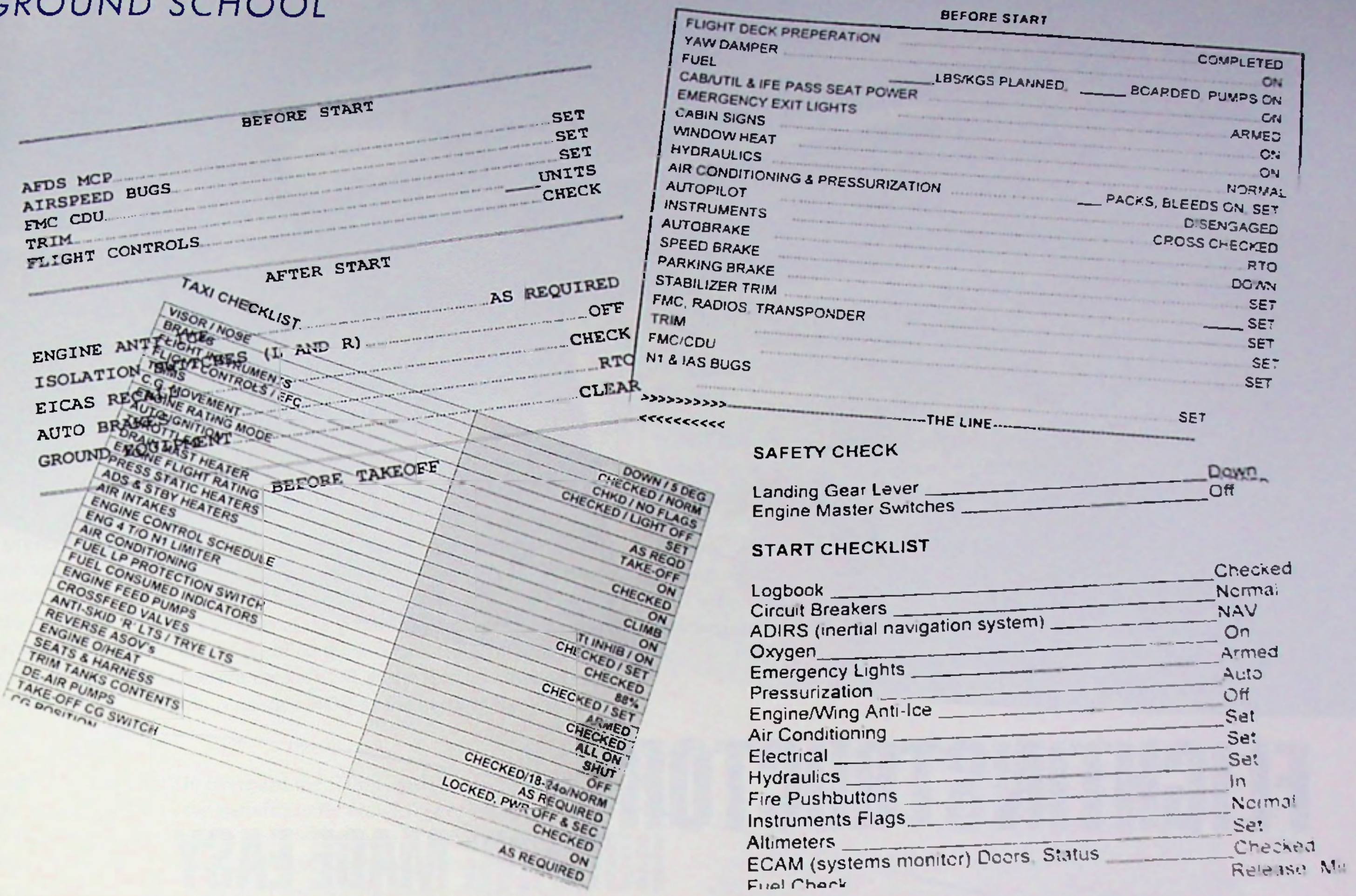
Don't forget the last item on the checklist… LAND SAFELY!

After landing and once you have vacated 'the active', we start shutting down the avionics that are no longer required. Firstly the transponder and the navaids, as well as the secondary comms, if you have one; although some aircraft have avionics switches fitted so this is not necessary. Then taxi in, shut down, put the aircraft to bed and go home… don't forget to write those all important hours in your logbook.

Playing with the big boys

Now the generic checklist has its limits, and a modern transport aircraft is no place for checklists of such a broad and general nature. There are so many systems and sub-systems that must be brought online in the right order if you are not to damage something or even someone. These checklists are a couple of pages long for normal operations and they include a raft of unwritten 'flows' that each pilot is to remember. The system is designed so that the captain and first officer both go through their flows before actioning the checklist as a final check that everything has been completed.

"FLYING THE BIG TIN MEANS TIME TO USE THE MANUFACTURERS' CHECKLIST. BUT BIG TIN ALSO MEANS LOTS OF CHECKLISTS; THERE IS A CHECKLIST FOR EVERY PHASE OF FLIGHT AND EVERY ABNORMAL PROCEDURE POSSIBLE!"



BEFORE START

AFDS MCP .... SET
AIRSPEED BUGS .... SET
FMC CDU .... SET
TRIM .... UNITS
FLIGHT CONTROLS .... CHECK

AFTER START

ENGINE ANT .... AS REQUIRED
ISOLATION .... OFF
EICAS REC .... CHECK
AUTO BR .... RTO
GROUND .... CLEAR

BEFORE TAKEOFF

TAXI CHECKLIST

VISOR / NOSE
BRAKES
FLIGHT INSTRUMENTS
FLIGHT CONTROLS / EFC
C.G. MOVEMENT
ENGINE RATING MODE
AUTO IGNITION
ENGINE FLIGHT RATING
PRESS STATIC HEATERS
ADS & STBY HEATERS
AIR INTAKES
ENGINE CONTROL SCHEDULE
ENG 4 T/O N1 LIMITER
AIR CONDITIONING
FUEL LP PROTECTION SWITCH
FUEL CONSUMED INDICATORS
ENGINE FEED PUMPS
CROSSFEED VALVES
ANTI-SKID 'R' LTS / TRYE LTS
REVERSE ASOV's
ENGINE O/HEAT
SEATS & HARNESS
TRIM TANKS CONTENTS
DE-AIR PUMPS
TAKE-OFF CG SWITCH

DOWN / 5 DEG
CHECKED / NORM
CHKD / NO FLAGS
CHECKED / LIGHT OFF
SET
AS REQD
TAKE-OFF
ON
CHECKED
ON
CLIMB
ON
CHECKED / SET
CHECKED
88%
CHECKED / SET
ARMED
CHECKED
ALL ON
SHUT
OFF
CHECKED/18-24o/NORM
AS REQUIRED
LOCKED, PWR OFF & SEC
CHECKED
ON
AS REQUIRED

BEFORE START

FLIGHT DECK PREPERATION .... COMPLETED
YAW DAMPER .... ON
FUEL ____ LBS/KGS PLANNED, ____ BOARDED, PUMPS ON
CAB/UTIL & IFE PASS SEAT POWER .... ON
EMERGENCY EXIT LIGHTS .... ARMED
CABIN SIGNS .... ON
WINDOW HEAT .... ON
HYDRAULICS .... NORMAL
AIR CONDITIONING & PRESSURIZATION ____ PACKS, BLEEDS ON, SET
AUTOPILOT .... DISENGAGED
INSTRUMENTS .... CROSS CHECKED
AUTOBRAKE .... RTO
SPEED BRAKE .... DOWN
PARKING BRAKE .... SET
STABILIZER TRIM ____ SET
FMC, RADIOS, TRANSPONDER .... SET
TRIM .... SET
FMC/CDU .... SET
N1 & IAS BUGS .... SET
>>>>>>>>>>
<<<<<<<<<<----THE LINE---- SET

SAFETY CHECK

Landing Gear Lever ____ Down
Engine Master Switches ____ Off

START CHECKLIST

Logbook ____ Checked
Circuit Breakers ____ Normal
ADIRS (inertial navigation system) ____ NAV
Oxygen ____ On
Emergency Lights ____ Armed
Pressurization ____ Auto
Engine/Wing Anti-Ice ____ Off
Air Conditioning ____ Set
Electrical ____ Set
Hydraulics ____ Set
Fire Pushbuttons ____ In
Instruments Flags ____ Normal
Altimeters ____ Set
ECAM (systems monitor) Doors, Status ____ Checked
Fuel Check Release Mi

"THESE ARE SOME EXCERPTS OF CHECKLISTS FOR VARIOUS AIRCRAFT. NOTICE THE DETAIL THAT YOU START TO GET INTO AND THE FORMALITY OF THE CHECKLISTS. VERY MUCH A NORMAL PART OF AIRLINE LIFE AND NEEDED TO MAINTAIN THE SAFETY STATUS OF AIRLINE TRANSPORT… AND YOUR CAREER! THESE HUMBLE PAGES WILL HELP KEEP YOU SAFE AND CALM IN THE WORST OF TIMES."

As you can see, these are much more formal and are required when operating an aircraft that is far more advanced than the humble basic trainer. It's thanks to checklists and procedures that air transport has the safety reputation that it does. It's checklists like these that ensure that the crew do not forget anything, even when they have multiple failures occurring at once. I once got to sit in on crews doing simulator rides when I did work experience years ago at the now defunct Ansett Australia. It is definitely a marvel watching a crew work together in tough times (although simulated) to get the job done. When I was younger I had the opportunity to spend some time in the cockpit (something that unfortunately no longer happens because of security requirements) and watching these guys was magic, it was like clockwork every time. Despite even the fact that the two crew members would hardly ever work together regularly (such is airline rostering) it looked like they have flown together every day of their careers.

In the flight sim world we can choose to implement different checklists should we so desire. However, with the multitude of advanced add-ons coming out these days already providing great reference material, there is not too far to look. Of course there is always a myriad of checklists available on the internet from legitimate and not so legitimate sources. It's often best to stick with the checklists that are provided with the add-on that you have, as these will cover everything that is simulated, and the manual will explain how to do that, whereas some checklists from the net that supposedly came from some operator may contain errors, and it may also have things listed that are not simulated in the package, or are customer options that are not simulated in the package.

For Legal Reasons...

In the real world you should be referring to the actual checklists for the aircraft that you are flying. The exception to this is the generic checklist, only where it is endorsed (in some variation) by your flying school/operator. Since gaining my licence I have carefully checked over the manuals for the aircraft that I fly, ensuring that my generic checklist covers the same items, and that I am aware of any type-specific information, like the differences in the Piper Cherokee Archer and Cherokee Warrior, or the differences in the 150 and 152. Real world pilots know that these differences are vital, and can mean the difference between the successful, or otherwise conclusion to a trip. Additionally, there are legal reasons to be sure of this in the real world. Unfortunately, we as pilots can be charged if we have not followed checklists or manufacturer guidelines which lead to an incident. In short, we can end up in really big trouble. Also, the completion of checklists in the larger airliners is recorded on the CVR (Cockpit Voice Recorder). This is to assist in the investigation should anything go wrong. One such example is the incident at Little Rock, Arkansas, where reviews of the CVR revealed that the spoilers were not armed during the approach, and a checklist was interrupted that caused that factor not to be picked up.

Safe flying out there folks, in front of a screen or otherwise, and don't forget those checklists! ✈

FLIGHT INSTRUCTOR

HOLDING MADE EASY

Skill Level: **All Levels** Instructor... **David Ison**

As you cruise along on your IFR flight you begin to hear chatter on the radio about deteriorating weather at your destination. Soon thereafter air traffic control (ATC) calls you with some bad news: *"Archer 426RM, expect holding, stand-by for instructions."* Almost immediately, panic sets in. When was the last time you had to fly a hold? Can you remember how to enter and fly a holding pattern? Or have you ever even flown a holding pattern before? In fact, for many simulator pilots, holding may be a new concept altogether. In real world flying however, holding is actually a common occurrence. Holding patterns are one of many tactics that air traffic control can use to prevent bottlenecks and defer traffic, which is becoming more and more of a necessity as worldwide traffic levels skyrocket. Obviously, the ability of a pilot to successfully navigate into and around one of these holding arrangements is a critical skill that must be honed prior to takeoff.

A holding pattern (or in some parts of the world it's referred to as a holding circuit) is an oval or "race track" shaped flight maneuver used to delay aircraft by keeping them in a confined space in relation to a known location. This way ATC knows not only where the aircraft is located exactly but also that it will not interfere with other traffic as it is confined within the pattern. Additionally, holding patterns are sometimes used in areas where air traffic control can not see aircraft on radar, often providing the sole means of aircraft separation.

There are many other reasons or situations that might bring about holding, including, strangely enough, requests by pilots. Traffic saturation is probably the most common cause. When too many aircraft try to fly into the same airspace or airports at the same time, ATC is forced to temporarily exclude new participants. Initially, ATC will try speed and heading changes. When these methods fail to provide adequate results, holding instructions are issued. Weather typically has a lot to do with slowing things down, thus reducing the number of aircraft that can operate in a given area. Airports must begin to use instrument approaches which take more time and finesse, while enroute aircraft need to deviate around storms, both of which reduce aircraft throughput.

ATC notifies pilots of the need to hold through what is called a holding clearance. It is important to note that all holding clearances contain the same basic information every time they are issued and any diversity among holding patterns comes in the form of different names and numbers. Every holding clearance should include the cardinal direction in which the hold is to take place, the name of the holding fix, the holding course (radial, bearing, airway, etc.), the outbound leg length in time or distance, and an expect further clearance (EFC) time (an EFC time is the time at which an aircraft can leave the holding pattern and continue to the destination if radio communications are lost).

If the controller does not want you to fly a standard holding pattern, i.e. with right hand turns, they will specifically request that left turns are used instead. Sometimes controllers will utilize holding patterns that are depicted on enroute or terminal procedure charts. In these cases, air traffic control only needs to state "hold as published" accompanied by an EFC time, but controllers may also include the direction of the hold and the fix name.

Before getting into the details about holding patterns themselves, there are a few terms that are used to describe them that need to be presented (see diagram 1). All holding patterns take place at a geographical location called a fix. A fix can be a NDB, a VOR, an intersection, or even a GPS waypoint. Aircraft always fly a holding pattern towards the fix. The part of the pattern where the aircraft is proceeding toward the fix is called the inbound leg or holding course. If the holding pattern uses a VOR as the fix, the inbound leg is actually a radial, while if using a NDB as the holding fix, it is a specific bearing.

Once the aircraft flies overhead the fix it turns 180 degrees (if already established in the pattern) to fly on what is referred to as the outbound leg. Pilots have to know which way to turn though. So there is something called a standard holding pattern. This simply means that pilots should turn right after over-flying the fix. A non-standard holding pattern, as you can imagine, means turns should be made to the left. We refer to the side of the holding course on which the pattern takes place the holding side. The opposite of this, logically, is the non-holding side. It is important to keep the aircraft as close to the holding side as possible while entering and maneuvering in the holding pattern.

This is because holding patterns are allotted a certain amount of "protected airspace." Protected airspace provides aircraft with obstacle clearance as well as keeping them clear of surrounding airspace and traffic. Go far outside this cosseted zone and you'll most likely get an earful from ATC, or worse, see mountain goats up close. So obviously it's rather important to stay within the confines of the designated holding area. There are several things that pilots can do to ensure this occurs, however.

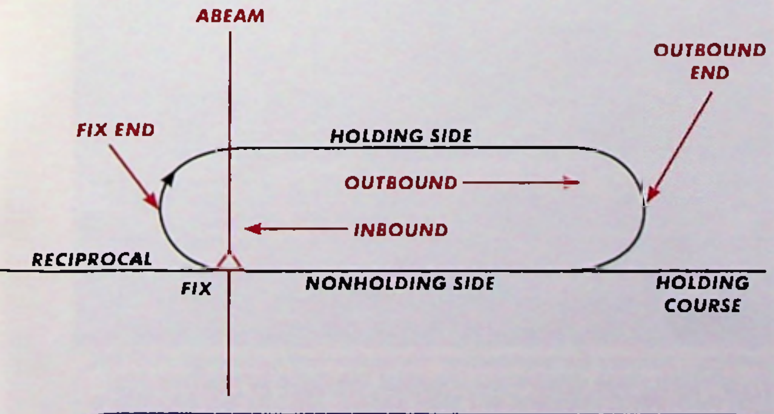
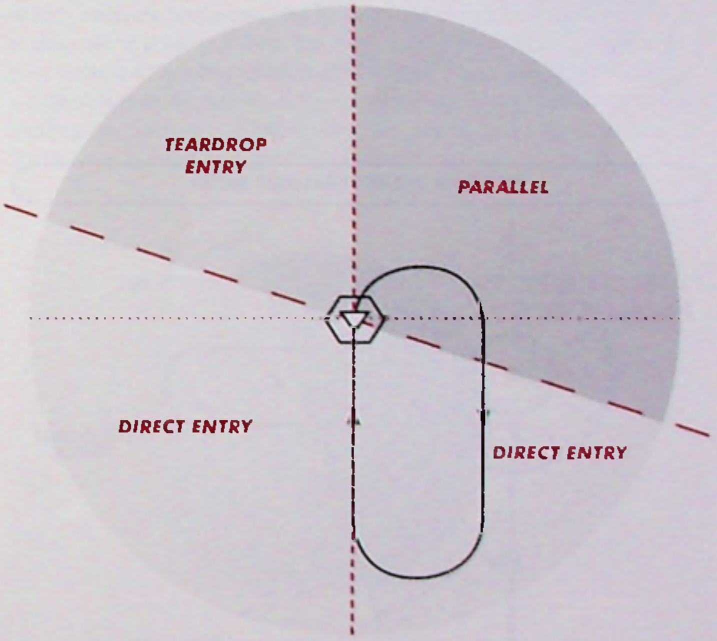


DIAGRAM 1: THE DESIGN OF A HOLDING PATTERN

Probably the best way to guarantee you don't wonder too far away from where you need to be flying is to operate at the proper speed. Holding protected airspace is based on speed limits (more room is given for faster speeds). Depending on the country of operation, holding speed limits exist based on altitude of operation. In the United States, aircraft must not exceed 200 knots from the surface to 6,000 feet, 230 knots from 6,001 to 14,000 feet and 265 knots from 14,001 feet on up. While, technically, the aircraft must slow to these speeds at least 3 minutes prior to entering holding, a good habit to get into is to ask ATC if you can slow down as soon as holding instructions are given. It doesn't make sense to burn fuel at cruise rates to hurry into a holding pattern. Plus you may slow down enough to bypass holding all together.

The next piece of the puzzle for staying within the proper airspace dimensions is flying an inbound leg of the correct length. Again, depending on country of operation, this may vary. In the U.S. though, flights up to 14,000 feet fly an inbound leg of one minute. Above that, it should be one and a half minutes. Sometimes DME is used to define the size of the holding pattern, which makes things a little easier. Don't be afraid to ask ATC if you can fly 10 or 20 mile legs in lieu of the timing method (just be sure you know how to do it first).



ENTRY OPTIONS

Once you have settled on the right airspeed and time/distance measurements, you'll need to determine the correct entry method. By using the right entry procedure, you'll stay as close to the center of the protected airspace (i.e. the holding pattern) as practicable. Clearly, the more insurance you have about staying safe (and keeping your pilot's license), the better. While there is a lot of hoopla in the flight training world about holding pattern entry types, in principle, they are only recommended, thus are not mandatory. You can often choose between two types and still stay out of from harm's way. You can even make up your own entry type, if so moved.

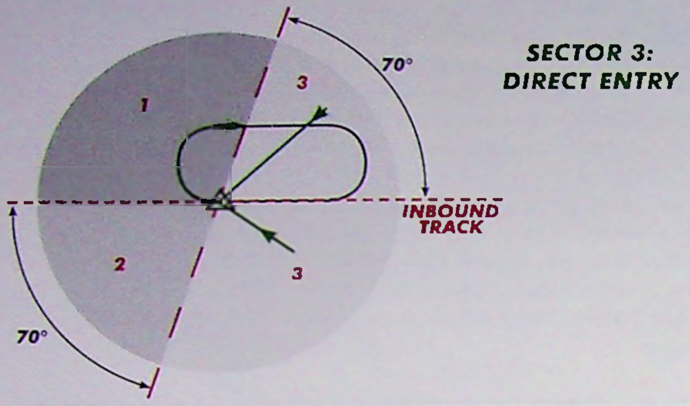


DIAGRAM 2: THE DIRECT ENTRY

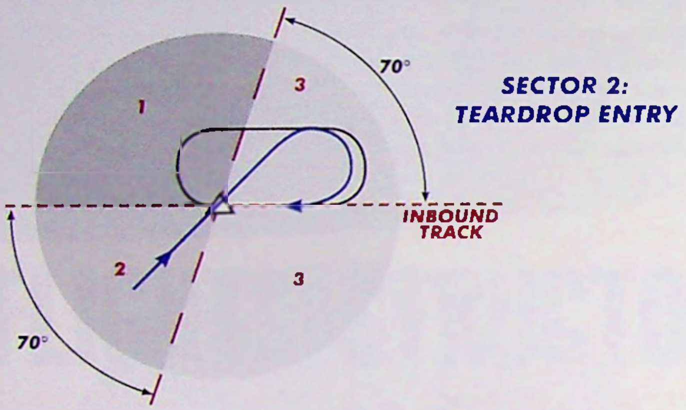


DIAGRAM 3: THE TEARDROP ENTRY

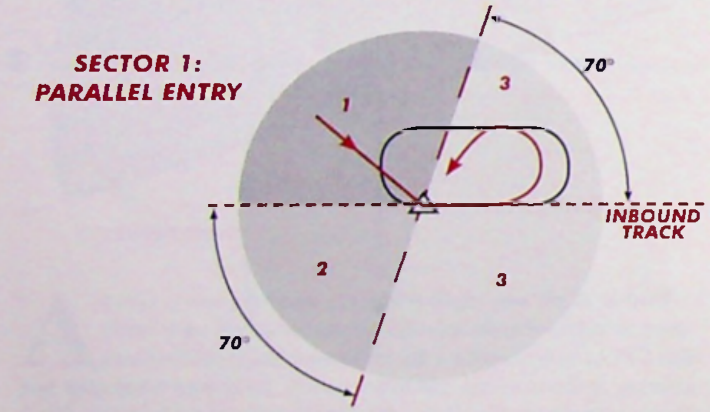


DIAGRAM 4: THE PARALLEL ENTRY

There are three suggested holding pattern entry types – the direct, the parallel and the teardrop. The direct entry is the easiest of all options (see diagram 2). Simply fly over the fix and turn to the outbound heading (while making sure to stay on the holding side). The teardrop entry requires pilots to turn to a heading 30 degrees away from the outbound heading (towards the holding side) after flying over the fix (see diagram 3). The parallel entry is often perceived to be the most complicated of entries yet only requires a little bit more contemplation. The parallel method calls for turning to the outbound heading and paralleling the holding course after passing the fix (see diagram 4). In the case of all of these entry methods, pilots should fly outbound for a minute (or other specified time/distance) and then turn back towards the fix flying along the holding course.

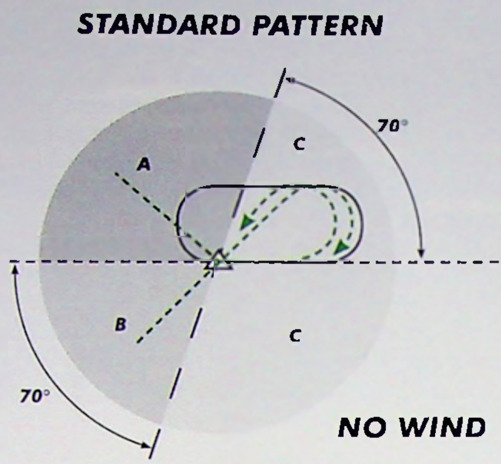
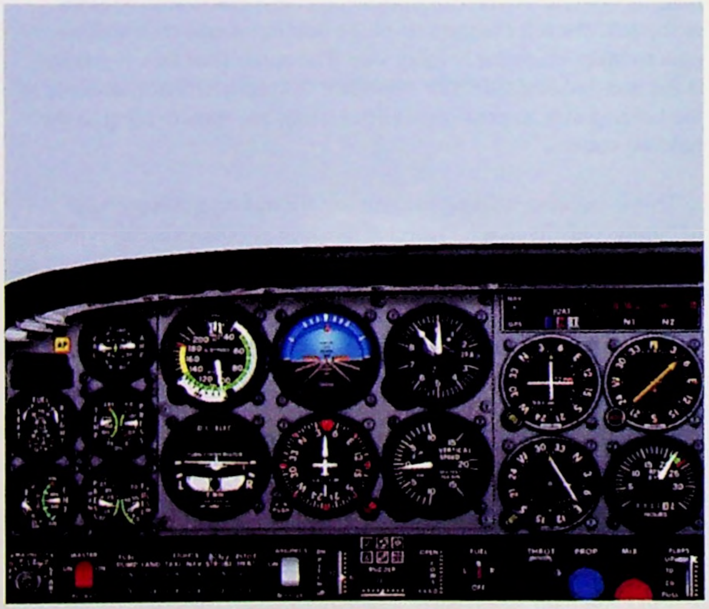


DIAGRAM 5: HOLDING ENTRY METHODS

There are a few philosophies on determining the proper holding entry method, most of which make things much more complicated than necessary. If you're coming from a certain direction, "x" number of degrees from the nose, you enter the pattern a certain way (see diagram 5). Yet it doesn't have to be quite so complicated. Instead of trying to do a bunch of mental math or trying to remember which sector means what entry, draw things out and pick the logical, i.e. the easiest, entry to perform based upon what you see. By breaking the entry process down into three simple steps, pilots can avoid overtasking their minds thus keeping the stress levels low.



THIS SHOWS THE AIRCRAFT INBOUND ON THE 225 RADIAL (045 INBOUND HEADING) TOWARDS LGC VORTAC

So enough about theory, how about some practice? While inbound to LaGrange VORTAC on Victor airway, Columbus Approach issues a holding clearance for sequencing: *"hold south of LaGrange VORTAC (LGC) on the 180 radial, expect further clearance at 1500Z."* Stop. Do not try to assimilate the entire clearance all at once. Divide things up into simpler pieces, tackling the problem in four easy steps.

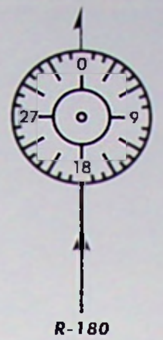


DIAGRAM 6: 180 DEGREE RADIAL FROM A VOR

The first endeavor is to draw (or visualize) the actual holding pattern. Sketch a fix and a 180 radial stretching due south (see diagram 6). Remember that holding is normally accomplished by flying towards the fix so the inbound leg is located along the holding radial. If it makes it easier to comprehend, pencil in an arrow head somewhere on the radial pointing towards the fix. The controller did not mention anything about the direction of turns, thus a standard pattern, i.e. right turns, will need to be flown. Also, no leg lengths were mentioned so the inbound leg needs to be one minute (if below 14,000 feet). Thus draw the racetrack pattern to include an inbound leg which overlays the radial (see diagram 7). The turn to the outbound leg begins when passing directly over the fix.

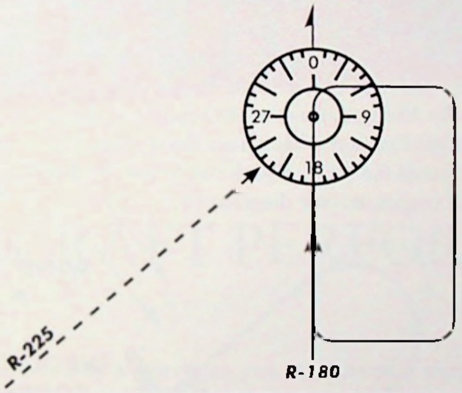
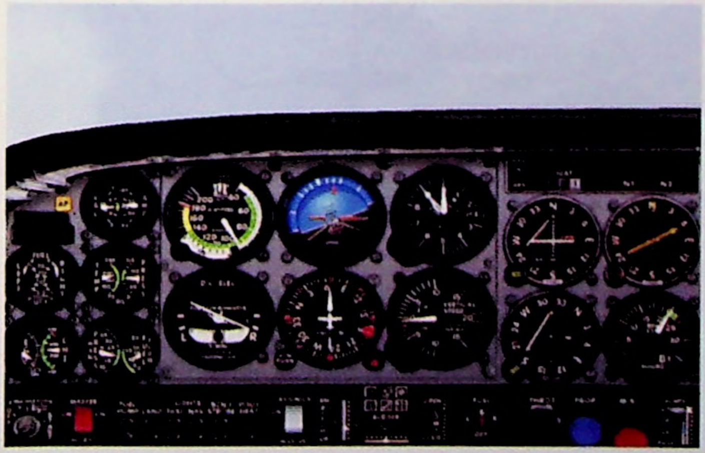
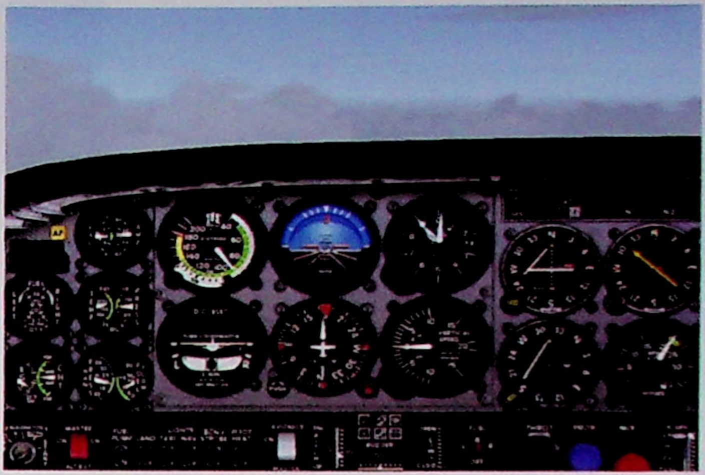


DIAGRAM 7: RACETRACK PATTERN ADDED



THIS SHOWS THE AIRCRAFT TURNING OUTBOUND AFTER PASSING OVERHEAD THE LGC FIX. NOTICE THAT THE AIRCRAFT IS TURNING TO THE OUTBOUND HEADING OF 180, BUT THE NAV 1 VOR IS SET TO THE INBOUND COURSE OF 360 FOR USE WHEN TURNING BACK INBOUND.



THIS SHOWS THE AIRCRAFT FLYING ON THE OUTBOUND LEG OF THE HOLDING PATTERN AT LGC.

The next footfall is to examine the aircraft's arrival at the holding fix. In other words, from which direction will the aircraft arrive at the pattern? Let's say that the aircraft is flying on Victor airway 6 inbound to LGC, which is defined by the 225 degree radial. If talking about radials initiates confusion, just keep the direction of arrival general, in this case it is simply from the southwest (or think of it in terms of your outbound heading of the hold). At this point, sketch or visualize a dashed line that stretches from the direction of flight directly to the holding fix. So now you know what the pattern looks like and how you'll meet it when you get there (see diagram 8).

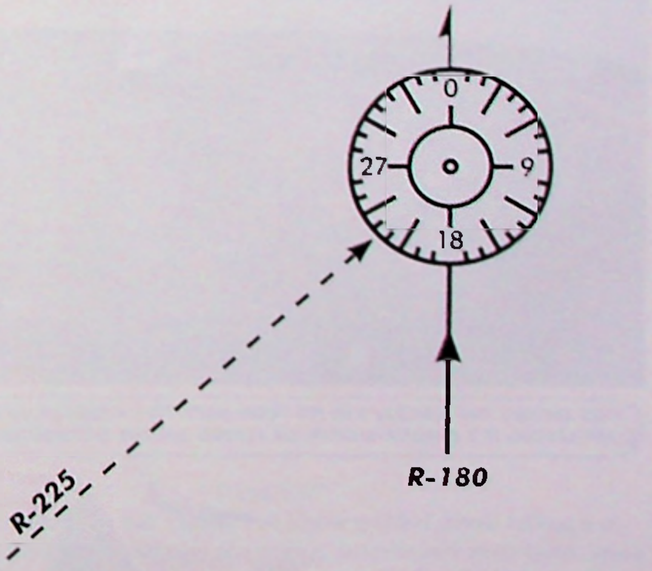


DIAGRAM 8: DASHED LINE TO HOLDING FIX

The final step is to determine which holding pattern entry makes the most sense. In the provided example, which method is most rational? A parallel and a teardrop entry are out of the question - they require too much maneuvering. Thus the correct entry would be a direct entry (see diagram 9). Fly to LGC then turn to the outbound heading of 180, cruise outbound for one minute, then head back to the navaid. Easy, right?

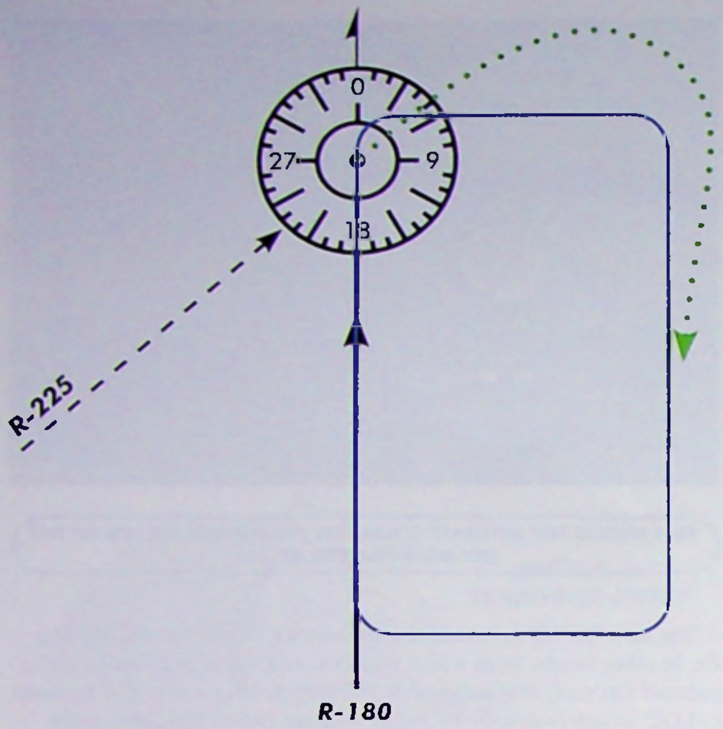
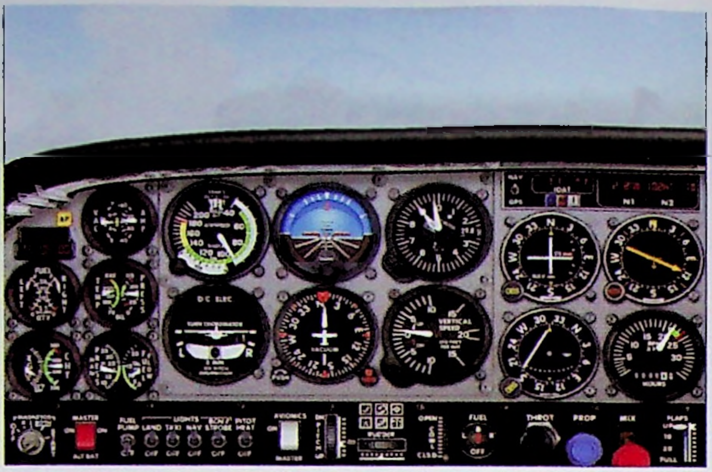


DIAGRAM 9: DIRECT ENTRY IS MOST APPROPRIATE IN THIS CASE

THIS SHOWS THE AIRCRAFT IN ITS TURN BACK TOWARDS LGC AFTER COMPLETING IT'S MINUTE WORTH OF FLYING ON THE OUTBOUND LEG

In a perfect world, holding would be this easy. But wind tends to make things more complicated. As you can imagine, if you have a strong tailwind while flying outbound for a minute, your inbound leg, complete with a headwind, will take longer than the requisite one minute. Thus some correction will be necessary to end up with a one minute inbound leg. The easiest way to start correcting for wind is to change the outbound leg timing by the error incurred on the inbound leg. For example, if your inbound leg ends up being one minute and 15 seconds, the error is 15 seconds. Therefore on your next outbound leg, you'd want to subtract 15 seconds, or fly 45 seconds. This rectification should yield an inbound leg of the desired time. It's not an exact science, so it may take a trip or two around the pattern until you've got it just right.



THIS SHOWS THE AIRCRAFT INBOUND ON THE HOLDING COURSE. NOTICE THE CROSSWIND CORRECTION REQUIRED TO MAINTAIN NEEDLE CENTERED (ABOUT 10 DEGREES)

Wind also affects the ability of the aircraft to re-intercept the holding course each time while returning to the fix. Since navigation guidance is actually available on the holding course (since it's usually on a VOR radial), you'll be able to see how well you're doing with staying in the right place. If a crosswind requires you to fly a correction to stay on course, simply multiply this alteration by three and fly that newly minted correction in the *opposite* direction when flying on the outbound course. So, say your inbound course is 090 but you must fly a 100 heading (10 degrees right) to stay on course. Obviously, the wind is from the south. When you turn outbound you'll need to fly 30 degrees, i.e. a 240 heading to the left to keep the pattern in the right location. This makes sense since you're making a correction towards the south, which you know the direction from which the wind originates (see diagram 10).

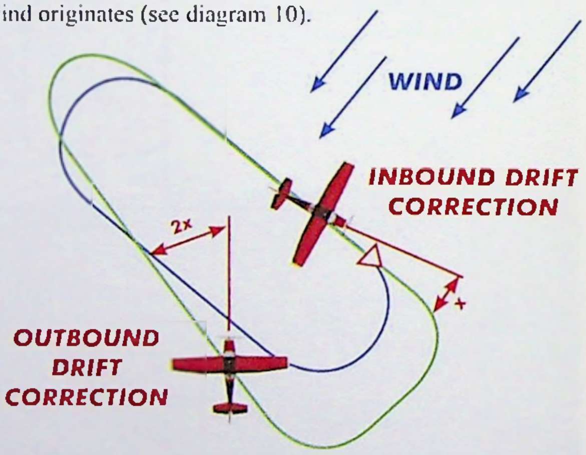


DIAGRAM 10: CORRECTING FOR WIND

With a little practice, the use of such a strategy will allow for quick execution of any holding request. Because all holding clearances are fashioned the same way, having a plan to dissect them will help disentangle the process. There's no doubt that holding can be made to be much more enigmatic than it really is. This is usually brought on by pilots' natural desire for precision which, of course, is a good thing when it comes to flying. But accuracy does not necessarily require complexity. By keeping things uncomplicated, one is less likely to dread holding patterns, which in turn will prevent repugnance concerning practicing and mastering them.

FLYING THE HEAVIES!

BY CAPT. CHARLIE VICTORIA

AIRCRAFT PERFORMANCE

Before you fly a heavy jet, you must be sure that it satisfies its performance certification issued by your country's aviation authority (e.g. FAA in the USA; CAA in the UK; JAA in Europe; CASA in Australia; LBA in Germany, etc). This includes airworthiness requirements and operational requirements. If your aircraft is airworthy, and if its operational-requirements are satisfied, the aircraft should be capable to perform its intended purposes in a safe matter.

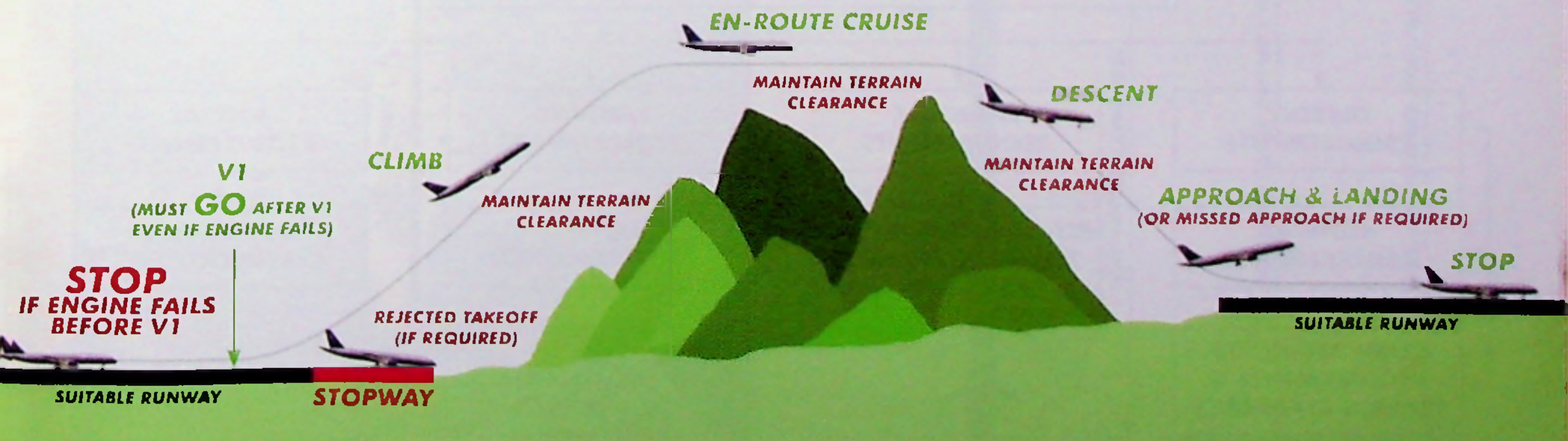

EN-ROUTE CRUISE
MAINTAIN TERRAIN CLEARANCE
DESCENT
CLIMB
MAINTAIN TERRAIN CLEARANCE
V1
(MUST GO AFTER V1 EVEN IF ENGINE FAILS)
MAINTAIN TERRAIN CLEARANCE
APPROACH & LANDING
(OR MISSED APPROACH IF REQUIRED)
STOP
IF ENGINE FAILS BEFORE V1
REJECTED TAKEOFF
(IF REQUIRED)
STOP
SUITABLE RUNWAY
SUITABLE RUNWAY
STOPWAY

FIG. FOR A SAFE FLIGHT YOU MUST: USE SUITABLE RUNWAYS, PLAN A SAFE TAKEOFF, CLIMB, CRUISE, DESCENT, AND LANDING. MAINTAIN TERRAIN CLEARANCE.

For your aircraft to be "airworthy", it should meet accepted standards, and being equipped and maintained in a condition suitable for safe flight. Each country, via its aviation authority, legislates (i.e. passes laws) to ensure that aircraft operate to an acceptable minimum level of performance. This ensures that:

- technically-acceptable methods are used in the certification of that type of aircraft by the aviation authority; and that
- a high standard of safety is achieved in day-to-day operations.

Each aircraft type's operational requirements include the rules to be used in calculating its weight and balance before each takeoff (to ensure that the aircraft is not too heavy to fly, and that you can control the pitch and roll attitudes in flight), and ensure that you can maintain terrain clearance throughout the flight (so you can avoid hitting trees, buildings, hills, mountains, etc). Checking weight and balance is now very possible with many of the quality aircraft add-ons available for our simulators, and these figures actually have an effect on the performance of our simulated aircraft too, so weight and balance should be considered by the modern-day virtual pilot.

Before an airline can use any new type of aircraft, very experienced *test pilots* demonstrate the performance of the aircraft-type to the aviation authority in its performance certification flights. The test pilots, working for the aircraft's manufacturer, fly a new aircraft (with new engines, very clean wings, on a dry and clean runway) as best as they can to demonstrate the very best performance possible. If the demonstrated takeoff-run on the runway is as short as possible (i.e. starting at the start of the runway, and using all maximum thrust), and if maximum braking is demonstrated in a rejected takeoff or during the landing after touch-down (even to the point where the brakes will start to burn), the aircraft will be allowed to operate into airports with smaller runways. This is a big plus for the manufacturer, because it can now sell this type to airlines who operate to smaller airports (e.g. Santa Barbara, in comparison to Los Angeles). The test results are known as GROSS performance.

The rules we "normal" pilots need to use in normal operations in an airline are less than the original flight test performance, since the ACTUAL performance is normally less because:

- most of us have only average pilot skills (and half of us are even below this average skill level); and also because
- the airframe/engine performance deteriorates with time; and also because
- the actual weight often varies from that shown on the manifest (i.e. the weight and balance document prepared before each flight).

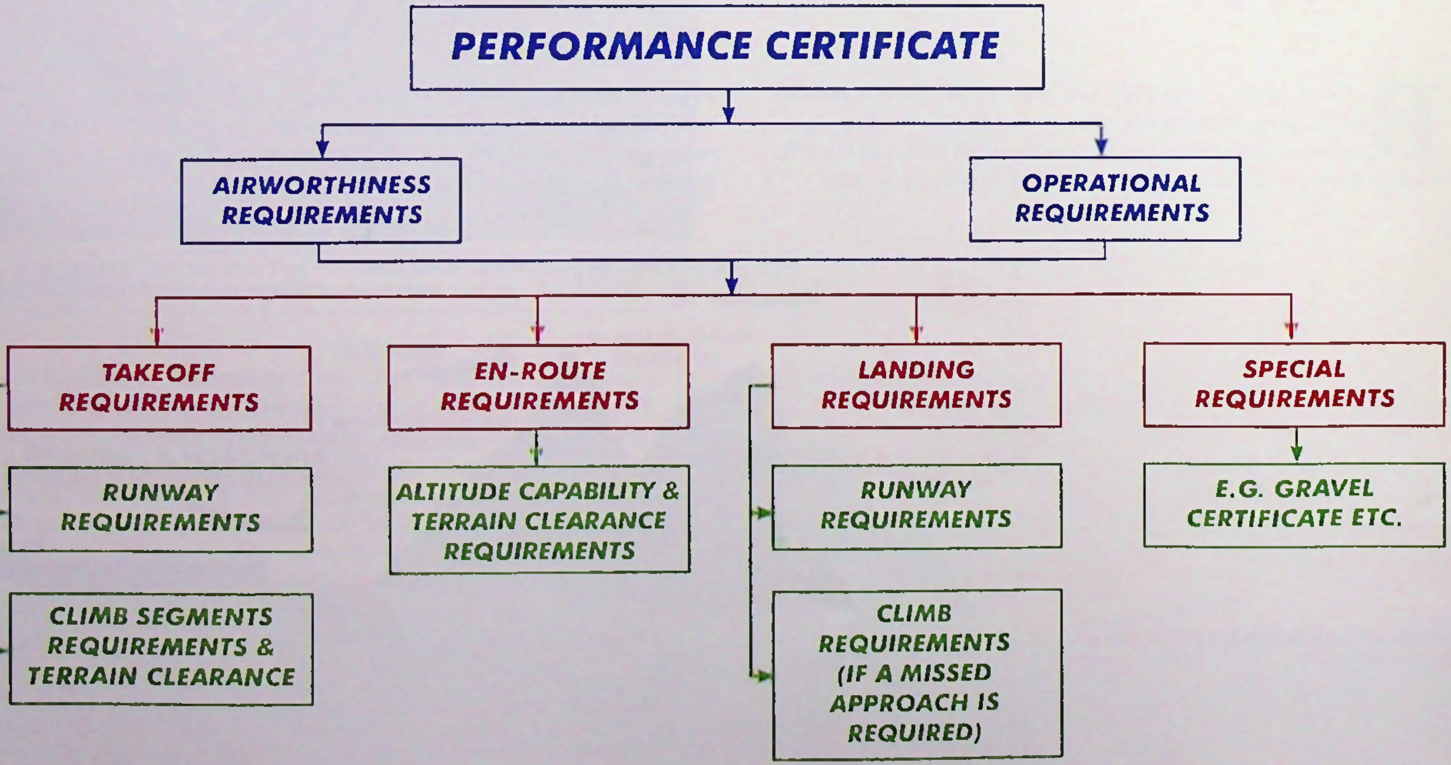
The GROSS performance results (from the test flights) are reduced by a percentage to give us the NET performance numbers which we normal airline pilots can use. NET performance provides a safety margin over GROSS performance.

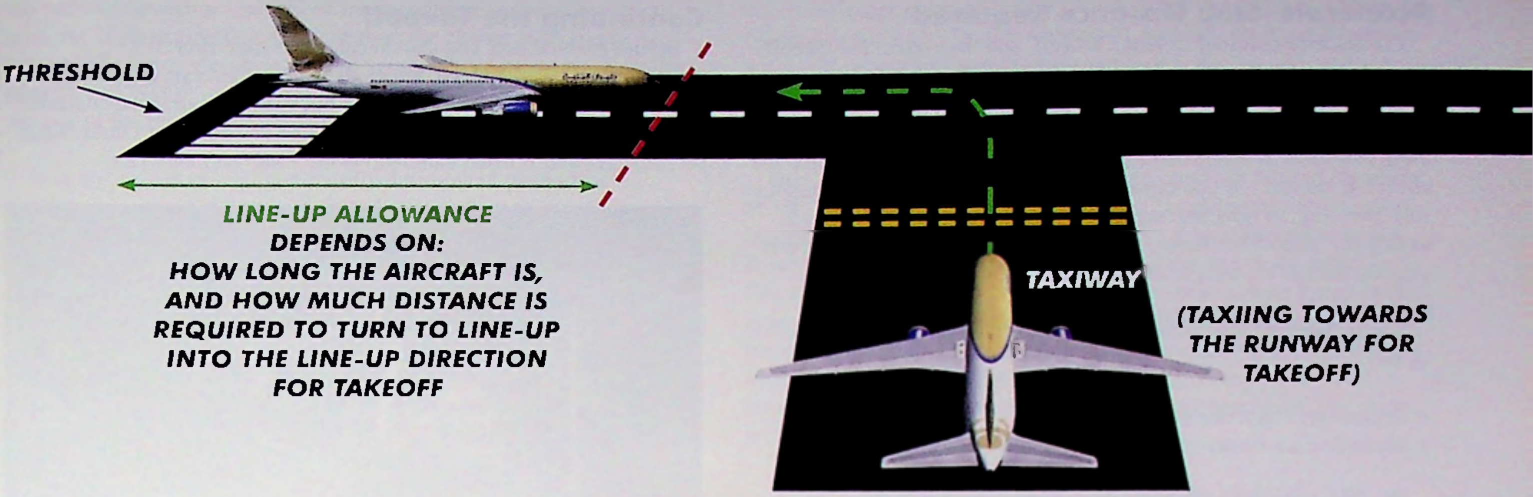
Takeoff: Field Dimensions and Runway Condition

Along with weight and balance considerations, many quality add-on developers have now fine-tuned their aircraft to perform very close to the real aircraft's performance specifications. Some packages even include detailed performance specification documentation to help the virtual pilot operate the aircraft to the highest level of realism possible. So we must now consider many more variables in our simulated flying.

To determine if a particular runway is suitable for our aircraft, we must consider:
Runway dimensions and condition: width, length, strength, surface (dry, damp, wet, standing water, flooded, icy, etc).

TORA (TAKE-OFF RUN AVAILABLE) = length of runway available: suitable for an aircraft's ground-run during takeoff, and is usually the runway's physical length. This is published on Jeppesen charts.


PERFORMANCE CERTIFICATE
AIRWORTHINESS REQUIREMENTS
OPERATIONAL REQUIREMENTS
TAKEOFF REQUIREMENTS
EN-ROUTE REQUIREMENTS
LANDING REQUIREMENTS
SPECIAL REQUIREMENTS
RUNWAY REQUIREMENTS
ALTITUDE CAPABILITY & TERRAIN CLEARANCE REQUIREMENTS
RUNWAY REQUIREMENTS
E.G. GRAVEL CERTIFICATE ETC.
CLIMB SEGMENTS REQUIREMENTS & TERRAIN CLEARANCE
CLIMB REQUIREMENTS (IF A MISSED APPROACH IS REQUIRED)

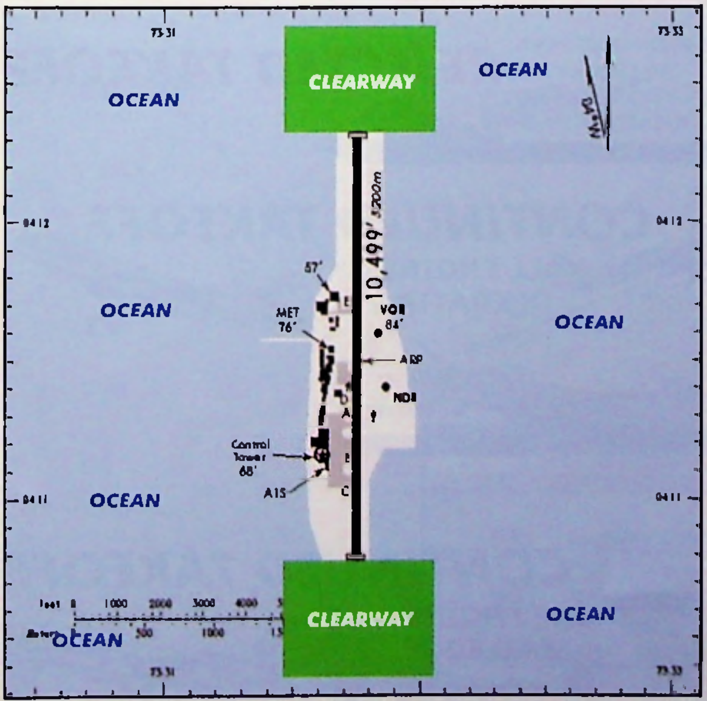


LINE-UP ALLOWANCE

Remember that when you are calculating the takeoff distance required, your aircraft may require a line-up distance to line up the aircraft's nose-wheel with the runway's centerline for the takeoff. Your Boeing or Airbus may require a 50 meter line-up allowance, and this is published in your aircraft's performance documentation.

TODA (TAKE-OFF DISTANCE AVAILABLE) = length of takeoff run available (TORA) + length of clearway available (if provided). This is also published on Jeppesen charts.

The clearway is a controlled area beyond the end of the runway where the aircraft can climb safely to 35ft above the ground. A clearway may be any surface, e.g. tarmac, grass, water, etc., and is not part of the aircraft's ground-run. The clearway is published on Jeppesen charts.

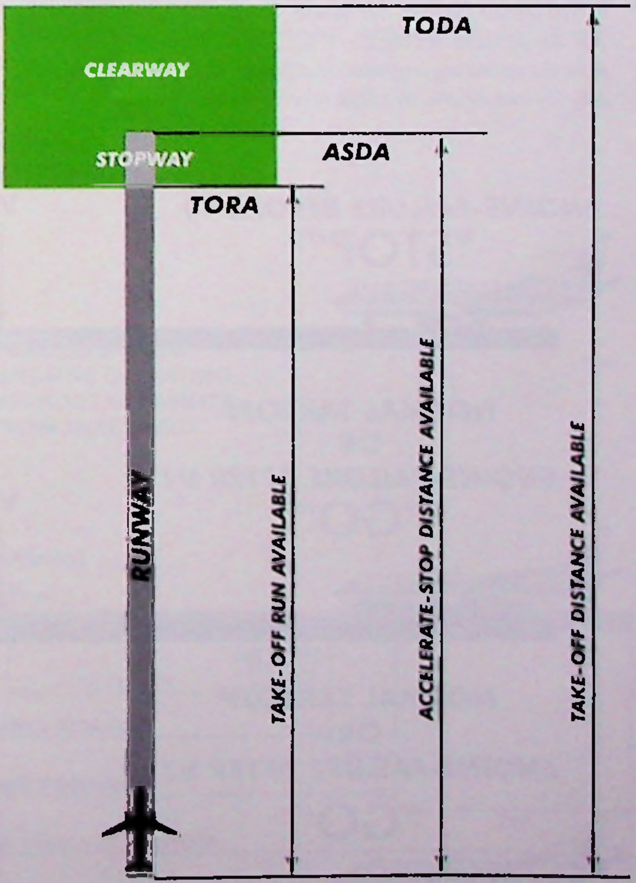


CLEARWAY AT THE MALDIVES

Rejected Takeoff

ASDA (ACCELERATE-STOP DISTANCE AVAILABLE) = TORA + length of stopway available (if provided). This is also published on Jeppesen charts.

The stopway is a controlled area beyond the runway's end, and is a ground-surface not available for the takeoff-run and rotation, but suitable to stop the aircraft during a rejected-takeoff, i.e. accelerate-stop, if needed.


CLEARWAY
STOPWAY
TODA
ASDA
TORA
RUNWAY
TAKE-OFF RUN AVAILABLE
ACCELERATE-STOP DISTANCE AVAILABLE
TAKE-OFF DISTANCE AVAILABLE

FIELD DIMENSIONS: TORA; ASDA; TODA

Accelerate-Stop Distance Required

The distance required to start a takeoff, and then reject the takeoff depends on your aircraft and can be calculated from performance information published in your aircraft's documentation. For each takeoff you should calculate the Decision Speed, V1, which will mean that there is still ground-surface ahead of V1 for you to stop the aircraft if needed – if you close the thrust levers to IDLE (all-engines still operating, or not), and apply full-wheel braking. If you decide to stop the takeoff-run before you have accelerated past V1, you can stop the aircraft on the ground surface of the runway + stopway.

The accelerate-stop distance required for your aircraft is the greater of the:

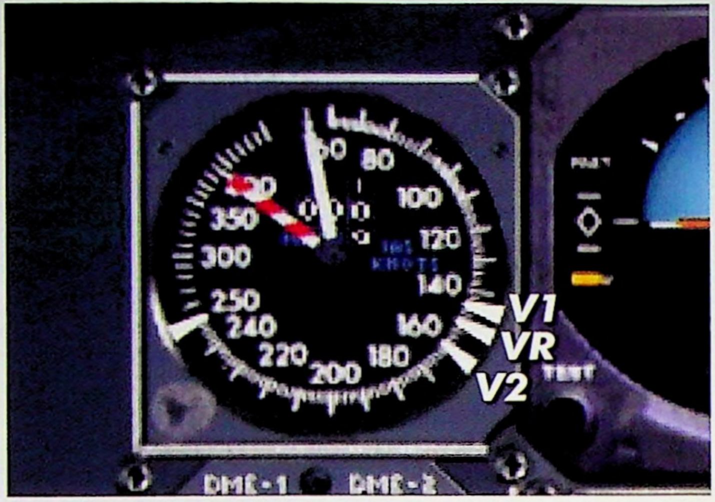
- engine-out accelerate-stop distance; or
- all-engine accelerate-stop distance

The accelerate-stop distance is the sum of the distances:

1. **From brake-release to V1**: From brake-release, at the start of the takeoff-run, and acceleration-distance using all-engines-operating to Decision Speed, V1 (i.e. before V1 you can 'GO' with the takeoff if all engines are operating, but must 'STOP' to reject the takeoff if an engine has failed, and then stay on the ground; but after V1, you must 'GO' - even if one of the engines has failed).
2. **From V1 to full-wheel braking**: From Decision Speed, V1, to the point where you have applied full braking in the rejected takeoff.
3. **From full braking application to the STOP position**: Wheel-brakes are vital to stop the aircraft on the ground, and this is increased if you deploy the wing-spoilers to destroy wing-lift and increase the weight on the landing gear, and therefore increase the braking effect. As soon as you decide to reject the takeoff you should apply full brakes, and pull the thrust levers back to IDLE. *Note: The use of reverse thrust from the operating engine(s) is a bonus, but remember that full brakes are much more effective than reverse thrust.*

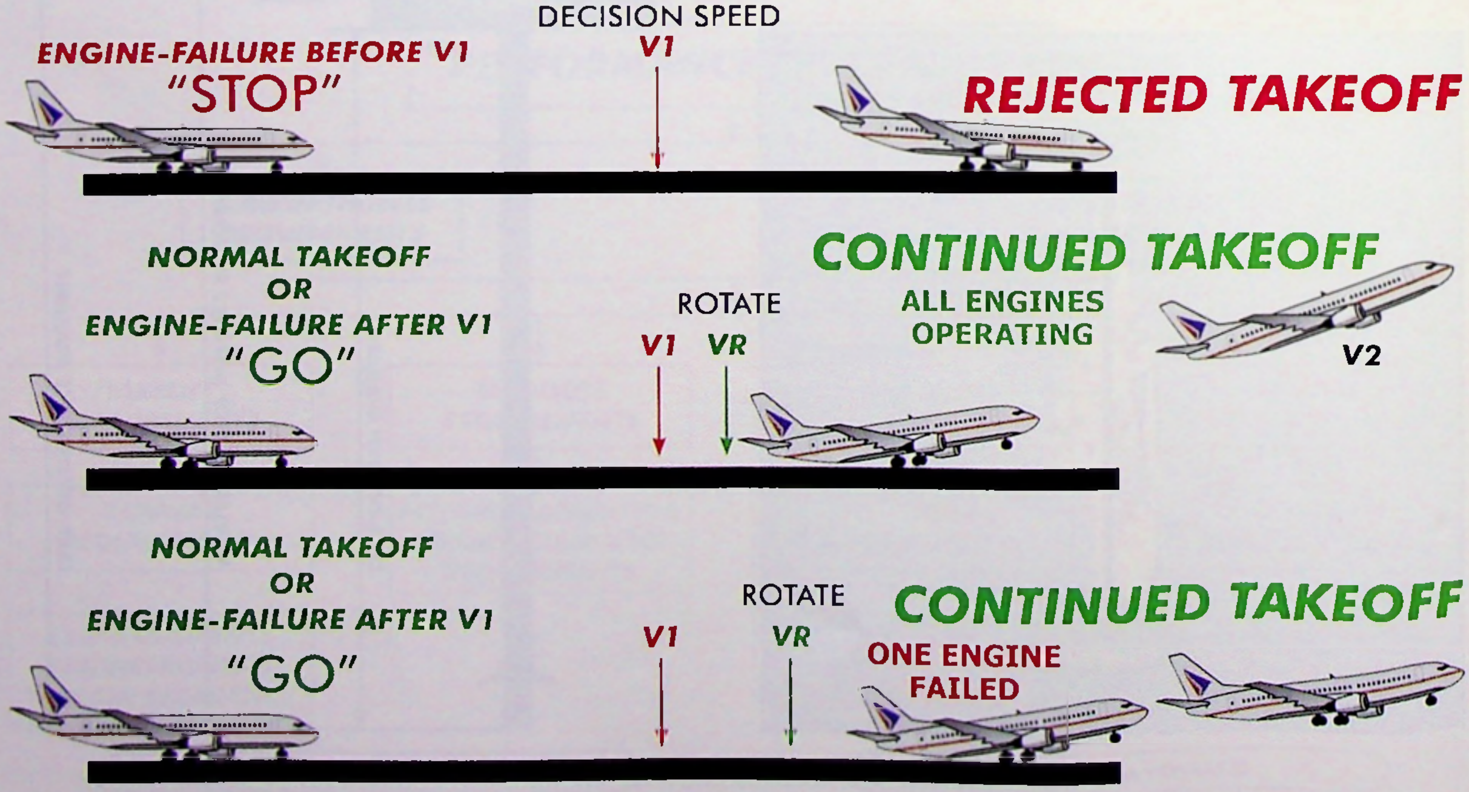
Continuing the Takeoff

Before each takeoff you should calculate your aircraft's characteristic takeoff speed, which depends on aircraft weight and takeoff flap setting. Then you can set bugs on your airspeed-indicator (ASI) to V1, VR, and V2. This can be done on the better commercial jet packages and is often handled via the FMC on many jets.



CHARACTERISTIC TAKEOFF SPEEDS:
DECISION SPEED (V1); ROTATION SPEED (VR);
INITIAL CLIMB SPEED (V2)

When you receive a 'takeoff clearance' from the Tower, check that takeoff flap is set, and that the aircraft is lined up with the runway centerline. Then, ensure 'brakes release' by the brake pedals and move the thrust levers forward to apply 'maximum thrust', as shown on the engine instruments. Use the rudder pedals to keep the aircraft on



the runway centerline, and check the increasing airspeed every few seconds. If an engine fails (indicated on the engine instruments or by aircraft yaw or vibration) before you reach V1, you can reject the takeoff, i.e. 'STOP', and stop the aircraft on the ground before you run out of the runway + stopway.

If everything is operating normally during your ground-run-acceleration up to the Decision Speed (V1, or faster), you can 'GO', and continue the normal takeoff with all-engines-operation. If an engine has failed at V1 or faster, even if the aircraft is still on its ground-run, you must still 'GO', i.e. continue the takeoff, even though the loss of thrust will reduce the acceleration of your aircraft towards VR and V2. After V1, the aircraft may be moving too fast, and with a lot more energy, which may make it impossible to stop the aircraft within the runway + stopway distance. The loss of thrust from the failed engine may also cause vibration and yaw (which you can counteract with rudder pedal pressure to keep the aircraft on the runway centerline). At VR you can start your rotation towards a suitable pitch-attitude to climb-out and accelerate towards V2 but, because of the reduced thrust due the engine failure, the engine-out pitch-attitude will not be as high as the all-engines-operating pitch-attitude. The acceleration will be less, the climb-angle and climb-rate will be less, and the terrain-clearance will be less.

The takeoff is considered to start at 'brakes release' and continue through the acceleration, rotate, and climb-out to 35ft. Before each takeoff you must consider the possibility of reduced performance in the climb-out following an engine failure!

Enroute Performance

Jet engines in modern Boeings and Airbuses are very powerful and very reliable, which means we can fly two-engine jet aircraft, like the Boeing 767 or Boeing 777, across long stretches of water, e.g. the North Atlantic Ocean, with few problems. Losing one engine means that you may have to fly a bit lower, but terrain clearance is not a problem. Depending on only one engine to reach your destination is a possible problem, so we plan our flights to operate at normal cruise speed within 90 minutes of a suitable airport where we could land, e.g. if we experience the failure of one of our two engines. Flying the North Atlantic near Canada, Greenland, Iceland and Ireland keeps us within 90 minutes of a suitable airport.

Landing: Field Dimensions and Runway Conditions

Our landing is based on approaching to cross the runway threshold at 50ft in a suitable landing configuration (landing gear down, and landing flap down) at a suitable airspeed (1.3 Vs). We aim to touch down at about 1000ft (300 meters) beyond the threshold. After touchdown we stop using maximum wheel-brakes, with speed-brakes extended on the wings (to decrease the lift-force from the wings, and put all the weight on the wheels, therefore increasing the braking action), and reduce the thrust to IDLE (using reverse-thrust is a bonus). We must consider the runway's surface condition (dry, damp, wet, standing water, flooded, icy, etc).

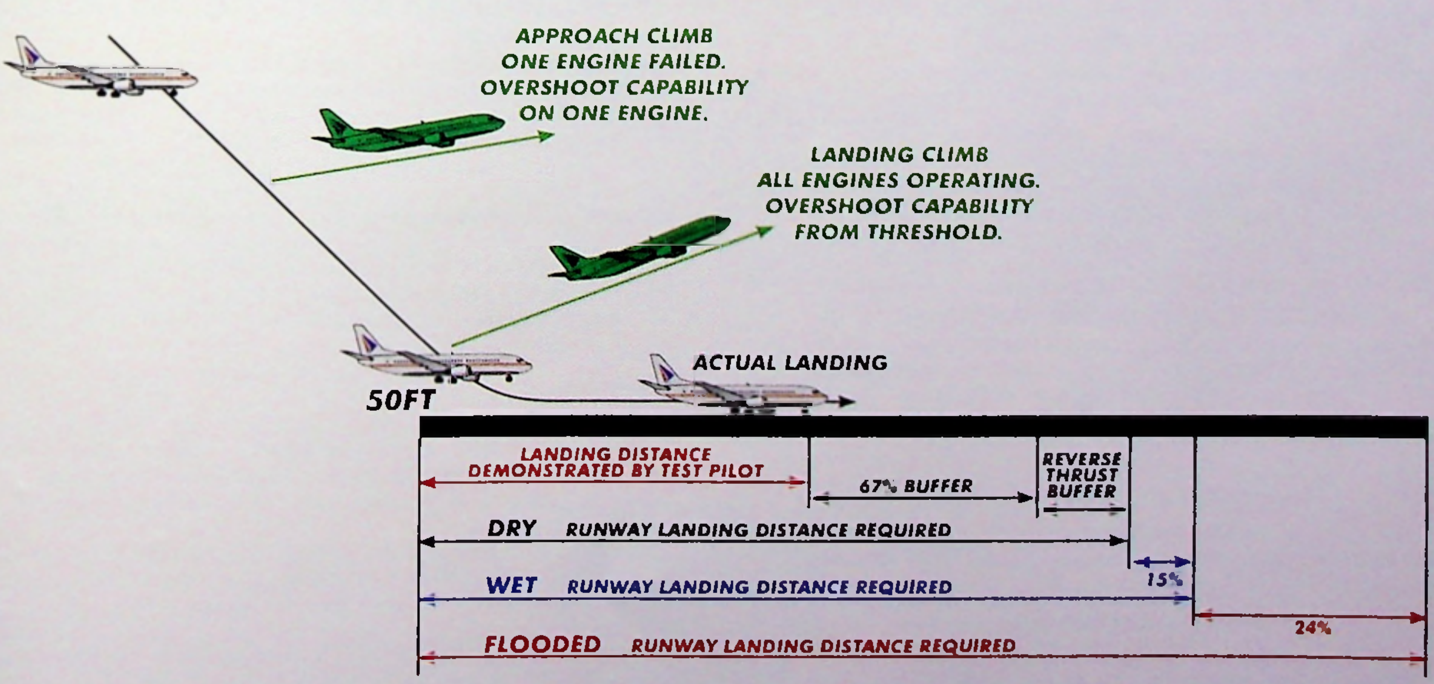
A test-pilot can demonstrate a short landing, which includes air-distance from 50 ft over the runway's landing threshold to touchdown + ground distance to stop. The requirements for normal pilots (like me) have a 40% buffer added, i.e. demonstrated landing distance x 1.67.

Even though we aim to approach and land on the runway, we must allow for a missed-approach, i.e. a climb-away, if a landing is not possible. The landing requirements must be sufficient for us to climb-away and avoid any terrain, even if we have lost thrust from one of the two engines.

Conclusion

As well-prepared pilots we must always be ready for any unexpected event. For example, if you cannot land on one runway or airport for some reason, e.g. bad weather, what will you do? Do you have enough fuel?
Be prepared!

Best Wishes,
Charlie VICTORIA ✈



LANDING REQUIREMENTS

COMING UP...
...in the October Issue

High Altitude Flight
Andrew Jones explores the world above the cloud tops as he looks at the considerations of undertaking high altitude flight using a variety of aircraft and how the pilot can get into trouble, even if still below the service ceiling of their aircraft. We also look at popular add-ons to see how well "flying high" is simulated.

Who's In Control? – Ground Control
This is the second part in a series of articles on the art of air traffic control (ATC). This month we take a look at the roles and responsibilities of the Ground Controller and how pilots should effectively communicate with this vital link in the ATC chain.

VFR: Israel
Fresh from the hop about the Hawaiian islands, Dr David heads to Israel to take keen simmers on another VFR flying adventure. The Flight simming hobby in Israel is surprisingly well maintained by a group of keen virtual pilots. Join the virtual tour next month.

DIY Panel Building Part III
Peter Stark offers the third article in a multi-part series on creating your own aircraft panels within Microsoft Flight Simulator. Next issue we will explore even more processes and steps to building your dream software flight deck.

Battle of Britain II Uncovered
Following on from our full review, Combat Ace, Derek Davis, shows you how to get the most out of this new combat sim with a range of tips, tweaks and flying tricks to keep you one step ahead ahead of the enemy.

IFC Blackpool 2005 Report
Francois Dumas reports on this year's annual IFC Blackpool (UK) flight sim gathering!

Reviews
We have planned reviews of these great new flight simulation products:
- FSPassengers 2004 • X-Plane scenery reviews
- Bonanza F33A • Charles De Gaulle / Fly Tampa scenery

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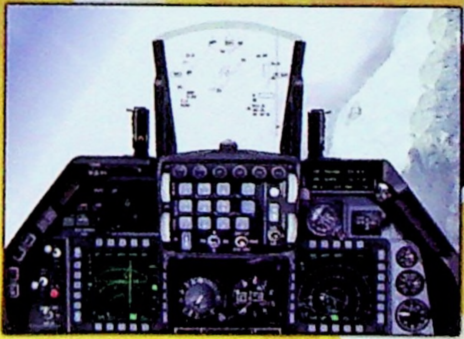

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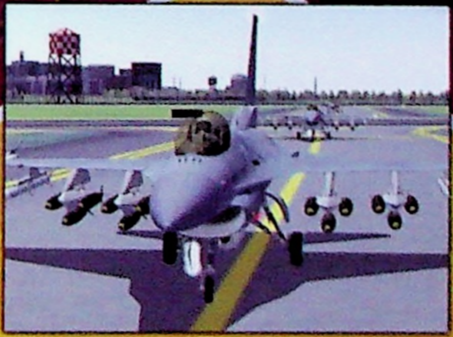

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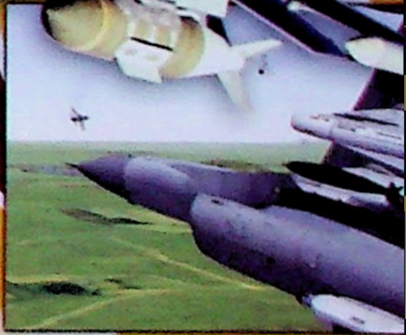

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